ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Vol. 12 No. 2. WEEKLY. | NEW YORK, SATURDAY, MARCH 10, 1888. | $3 per annum. Single Copies, 6 Cents.

Copyright, 1887, by ELECTRICAL REVIEW PUBLISHING COMPANY, 13 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

A Most Creditable Electric Light Installation.

The electric light installation in the United States Court House and Post Office, Philadelphia, was completed last week, and is specially noteworthy, not only for the high order of work done, but particularly for the many difficulties overcome in placing a plant in a building built entirely of iron and stone, where no provision for such an installation had been made. The United States Electric Lighting Company, of New York, did the work and succeeded in overcoming the numerous obstacles, and have installed an incandescent plant that is a credit to the men having it in charge, and a permanent reminder of the great advance in electric work that has been made in recent years in this industry.

There are about 3,000 lights in the building, supplied by seven dynamos, which are driven by two 150 horse power Porter-Allen engines. The engines are coupled on to two ends of a single shaft by Frisbie friction clutch pulleys, and all seven dynamos are driven direct from this shaft. This arrangement enables either or both engines to be run at pleasure. The mains from the dynamos center at a switchboard, where, by means of heavy lever switches, any dynamo can be instantly thrown in or out of circuit. In each dynamo circuit is an ampere well, and a rheostat in the field circuit of each machine makes it possible to keep them all perfectly balanced, so that each machine running does the same amount of work, and reversing of any dynamo is prevented. In addition to this, on the switchboard is a main rheostat which controls the whole system, and a potential indicator, which shows any variation in the electromotive force in the whole system. At the same switchboard the light circuits center, thirty in number, each controlled by a switch, so that the engineer has absolute control of every light in the building. There were over fifty miles of wire, of Okonite and Grimshaw makes, used in the installation, and twenty miles of moulding, so well arranged that not a wire is in sight, nor is the moulding at all noticeable.

The engine and dynamo room is a model of neatness and convenience, in which is shown the work of a master hand. The distribution of lights is most admirable, and was planned by Government Inspector J. E. Powell. When the REVIEW's representative visited the plant, last Wednesday evening, Mr. Powell was found making his tests, and seemed greatly pleased with the results obtained, though he was necessarily non-committal, not having made his report to the authorities at Washington.

The entire electrical work was planned by Gen'l Sup't D. E. Drake, of the United States Electric Light Co., and has been carried out under the personal supervision of Mr. E. W. Smith, of the same company, and the absolute uniformity of light in all parts of the building gives conclusive evidence of the skill of these gentlemen. Mr. Smith, having completed this work has now gone to Pittsburgh to take charge of an installation of the same size in the new Allegheny County Court House and jail, which contract has recently been awarded to the United States Company.

The Simplex Tree Insulator.

A recent Boston patent is that taken out by Mr. H. H. Cutter, the article manufactured and for sale by the Simplex Electrical Company, for the Simplex Tree Insulator. This consists essentially of a malleable iron base, with an upright bar at either end, and punctures for fastening to the tree or limb. A certain curvature at the end allows the use of a wire fastening also, which, with the screws, allows of no possibility of derangement in position. Porcelain rollers, with

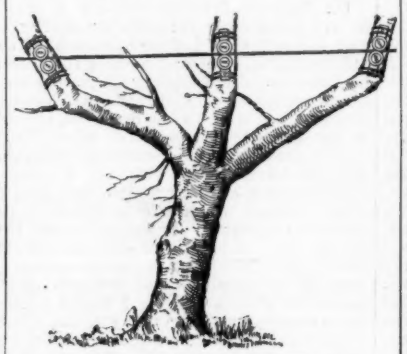


FIG. 2.—INSULATOR IN USE.

circumferential grooves near the top, fit easily upon the uprights, perfectly free to revolve, and held in place by washers and split pins. The cuts show the insulator full size, No. 1, and a number of insulators in use on tree branches, No. 2.

The insulator possesses advantages of great strength, the solid bed plate and uprights being of the best malleable iron, and simplicity, with no chance of getting out of order. The wire passes between the two porcelain insulators, which revolve as the limb sways, passing along the wire without any injury to the covering. It will be seen that a sagging wire will be entirely unnecessary as, if the insulators are properly placed, it will be subjected to little, if any, stretch. When this insulator is as widely used as it bids fair to be, with a good insulated wire, grounds in trees will undoubtedly be a thing of the past.

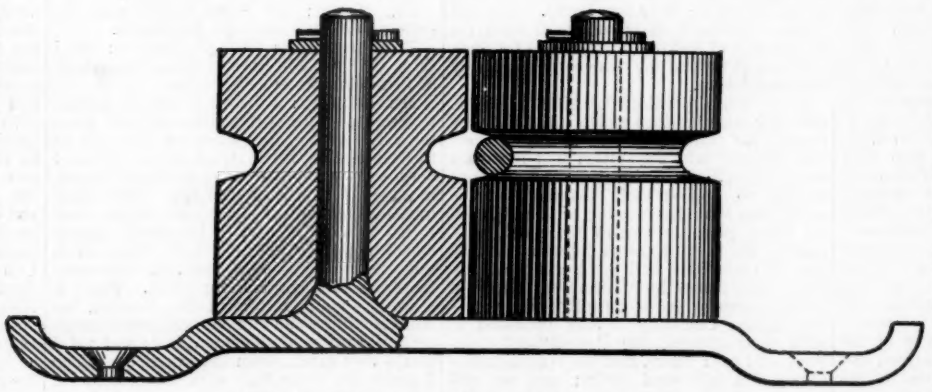


FIG. 1.—FULL SIZE OF SIMPLEX TREE INSULATOR.

Another Interesting Description of the New Electrical Headquarters.

In its issue of March 3 the *Scientific American* devotes its front page to a graphic and interesting portrayal of a number of the prominent features of the new Club House of the Electric Club. We reproduce some of the illustrations in this issue. In its description of the Club House the *Scientific American* says:

Electrical science may be said to have been established upon a new basis socially in this city when, on Tuesday, January 31st, the new headquarters of the Electric Club were formally opened. The proceedings were marked by the eminence of the invited guests, among whom were included the leading electricians of this country, as well as by the interesting address by Prof. Rowland, of the Johns Hopkins University, of Baltimore. In our present issue we illustrate some of the interior details of the club's new mansion, which throughout is fitted up with the utmost luxury. It is situated at No. 17 East 22d street, where a building originally of great elegance, and which is now renovated throughout, is devoted to its uses. * * * The introduction of so extensive a system of wires involved a complete overhauling of the building, and this work, in connection with the decorative and other operations, involved an expenditure, it is said, of some $40,000. In the basement are the billiard rooms and kitchen, and on the main floor are situated the parlors and restaurant. These, like the rest of the building, are lighted by electricity; for the principal apartments electroliers in brass and silver bronze, and thickly hung with strings of glass prisms and pendants, are used. Cut glass shades cover the incandescent burners. The effect of this work is extremely rich, although, of course, obtained at a sacrifice of some light, which again is made up for by the large number of lamps used. The perfection of the system of lighting was very perceptible on the occasion of the evening of the opening. The parlors were then crowded with the assemblage of guests listening to Prof. Rowland's paper. Had the room been lighted with gas as brilliantly, the heat thereby produced would have made it very uncomfortable for all. As it was, the air of the room was perfectly pleasant, although it was flooded with light. On the next floor are situated the library, lecture room, and committee room. In the committee room is the long distance telephone, with which communication can be had with all connected cities. In the library is an embryonic collection of patent reports and other works destined ultimately to acquire much value. A set of the French *brevets d'invention* is a very valuable portion of this collection.

The objects of the club are not purely social. President Davis, in his address at the opening, summarized them briefly and concisely. The hope is that the club will have a true work to do in furthering the progress of electrical science and its rapidly increasing application to the commercial interest of the world. It is designed to have the club supply the useful functions at once of a museum, a laboratory, a lecture room, and a library. For the use of lecturers, apparatus is to be supplied, which, in connection with the large generating and storage plant, will give unusual facilities for work on a large scale. It is proposed to have lectures given

FIG. 1.—FRONT DOOR DESIGN OF THE ELECTRIC CLUB.—BERGMAN ELECTRIC LANTERN.

by the most distinguished scientists periodically during the season. This idea was happily carried out at the opening, in the selection of so eminent a physicist as Prof. H. A. Rowland. The laboratory project remains to be carried out. Its constitution and by-laws are conceived in a spirit of simplicity and liberality. The institution is incorporated under the laws of the State of New York.

Electric Accident Preventer.

An Austrian engineer has, it is said, designed a truck to run before every railway train, being maintained always at a fixed, but adjustable, distance in front, by the force of an electric current, transmitted along the rails from a dynamo on the engine.

The current is conducted through mercury contained in glass tubes on the pilot truck. If, therefore, the truck comes into collision the tubes are broken and the contact consequently destroyed. The interruption of the current instantly and automatically applies the brakes on the following train.

It is claimed by the inventor that two expresses, fitted with this system, might with impunity be set to run full tilt at each other. The collision of their pilot trucks would arrest the progress of both trains before they could meet. The element of human fallibility is accordingly entirely eliminated, and drivers may dash through a whole series of danger signals without risk, being automatically arrested the moment they reach the spot that is really dangerous. Hurrah for electricity!

—— It is estimated that there are more than 2,000 electric lamps now in use in coal mines in England.

Patent Legislation.

THE FULL DISCUSSION OF THE QUESTION BY THE NATIONAL ELECTRIC LIGHT ASSOCIATION

PITTSBURGH, February 22, 1888.

The association met pursuant to adjournment at 10 o'clock A. M.

THE PRESIDENT: The first thing in order this morning is the reading of the report of the Legal Committee, which will be read by Mr. Arthur Steuart, of Baltimore.

MR. STEUART: I have the honor to make the report of the Legal Committee upon the question of improvements in our Patent laws. The Legal Committee was constituted some years ago, and has been working along in an effort to arrive at some intelligent results on the question of improvements in our patent system. We all know the intimate relation that exists between the electric lighting interests and the patent system of this country, how closely they are related, and how much the growth of the electrical interests is dependent upon the perfection of the patent system, and we all know from personal experience the serious effects and disadvantages that exist in the system as it is now administered.

I must also make a report of the work of the committee which I have had in hand during the last six months, in attempting to bring about the results which are outlined to some extent in my report.

At the meeting in Boston, held last August, the association passed a resolution authorizing the Legal Committee to introduce into Congress a bill providing for the creation of a commission, to be appointed by the President of the United States, whose duty it should be to revise the existing Patent laws, and report a bill to Congress at its next session, providing for such changes as they thought desirable. In pursuance of the preparation of that bill, and in looking over the ground to see whether the course was a desirable one, I was met on all hands and on every side by the earnest opposition of the ablest and most careful lawyers in the country—those most interested in the patent system—and they came to me with this proposition: They said: "You are doing a good work; you are in a good line; but there is an evil that we cannot escape, there is an opposing force that we must consider, and that is a deep-rooted opposition to the patent system as an element in our national policy that exists in some parts of this land. That opposition is represented upon the floor of Congress by a great many members, and any bill which is introduced of this kind, opening the door wide to revision, may have the effect (and the danger is an imminent one) of giving opportunity to those enemies of the system to come in and do the system harm." As the result of that advice (and I found the sentiment which prompted it very general and prevailing) the committee determined to change its course of action and not introduce that bill, but to frame another. The question of what that other bill should contain has occupied the mind of the committee up to this time. It has not been fully determined, but it will be very shortly. For the purpose of arriving at a solution of that question, and determining what that bill should contain, and for the purpose of interesting the members of the association in the work of the committee, the committee entered into personal correspondence with every member of the association, and also with every person whom they could find who was directly engaged in the electrical business. I think that I do not now draw it too strongly when I say that they have been corresponding with not less than one thousand people throughout the country, and we have by that means been able to gather a mass of valuable information. The committee published a pamphlet, 2,000 copies of which were distributed among the members of the association, the members of Congress, and among others who were interested in the subject. They have more lately published another pamphlet, 1,000 copies of which have been distributed throughout the country, the purpose of which was to interest those whom we could reach on this subject, and get their minds into a condition so that when we were ready to present the bill we would be prepared to call upon them for their aid. I go from here to night to Washington for the purpose of making arrangements in your behalf before the Committee of Patents in the House, and I have a memorandum here of several subjects which are now pending before the House Committee which it is our effort to oppose. For the purpose of looking after this question the committee have been partially instrumental in organizing in the City of Washington a Bar Association among the patent attorneys in Washington. That association embraces the most important men in the profession in that city; and, being on the spot, we look with great confidence to their aid in opposing anything detrimental to the system, and in aiding us very materially in continuing our efforts before Congress. When I presented the subject to them I found that they were deeply interested in it, and anxious to join hand in hand with us in attempting to benefit this system. The meeting which will be held to-morrow will be attended by a number of gentlemen whom I have notified, from different parts of the country; from Chicago, Boston, New York and Providence—all of them will come to oppose the passage of certain bills which are now pending before the House. One of them is a bill which provides that patents not used in manufacturing, but held to control the trade, shall be vacated by

FIG. 2.—SHOWING METHOD OF OPENING DOOR OF ELECTRIC CLUB.—EDWARDS & CO.'S PATENT.

due proceedings, and at the instance of anybody who wants to use that invention. A second measure is an innocent purchaser bill (which you are probably all familiar with) which protects a man who cannot be proved to be a fraudulent user. The third bill is to give the circuit courts of the United States the power, at the instance of a would-be user of a patent, to take and examine the patent, and determine what would be a reasonable royalty for that infringer, or would be user, to pay for the use of the patent, and to grant to him the privilege of using it without any restraint on the part of the owner of the patent. A fourth bill limits the right of the United States patent from seventeen to seven years. There are two other innocent purchaser bills, and two others which strike at the question which is now troubling telephone companies, and which may some day trouble you in your electric light business—and that is the interference of State legislatures with the right of the patentee to use his patent, or the right of the owner of a patent to control the use of that patent. In Indiana the legislature has passed, as you are all probably aware, a law which limits the price which shall be paid by its citizens for the use of the telephone. That law has resulted, in many cases, in the refusal on the part of the company to permit telephones to be used at all, except on their own terms. This bill is now introduced (there are two of them) for the purpose of making it impossible for State legislatures to bind the owners of patents by such legislation.

All of these questions are vital questions, and they are questions which lay at the very root of the patent system. If any of these bills become laws the system will receive a very serious blow; and it is our duty in your interest to oppose their passage. At the same time that this meeting of the committee takes place to-morrow there will be a meeting for the purpose of opposing the passage of these bills, and there will be a number of gentlemen in Washington, many of whom represent the electric light interests—the Edison Company having promised to send their counsel, the Consolidated Company will send theirs, and the Westinghouse Companies will send theirs; and we will have gentlemen from various parts of the country, all of whom are deeply interested in this question and in the effort to reform our patent laws.

The president has just handed me a memorandum which says that there are similar laws to this in effect in Illinois, before the legislature of our own State, which is now in session, limiting the price for telephone service in Pennsylvania to the same rate as is fixed in Illinois, three dollars per month.

As I was saying, we will hold a convention in Washington, to-morrow, to discuss the question of exactly what is desirable, and in what essential particulars we shall move. We are all of us very well satisfied that our best chance of success lies in attempting very little—in narrowing our efforts down to one or two salient points, and concentrating our efforts upon those. The probability is that we will concentrate our efforts upon two points only: one will be an increase of the salary of the Commissioner of Patents to such a sum as will justify a man of sufficient capacity in holding the position long enough to be able to establish some practice in the Patent Office which would be satisfactory. The figures were given me the other day. I did not make the calculation, but gentlemen of eminence in Washington, who have been familiar with the office for many years, have said to me that they made the calculation, and that the result is in finding that for fourteen years the average time of the Commissioner of Patents has been but thirteen months. When you consider that each one of these men has gone in there with comparatively no familiarity with either the laws or the practice of the office—with some few exceptions, for some of them have, of course, held office for a longer time and some for a shorter time—when you consider that each of those who have gone in there have gone in with but little familiarity with the subject, you can understand how perfectly chaotic must be the condition of the rulings and practice of the Patent Office. That will probably be one of the points upon which we will center. A second will be to establish an intermediate Court of Patents, which will hear appeals for the Circuit Courts, and also from the Patent Office. This is the work which the committee now have before them.

DR. MASON: So far as I have been able to learn, the efforts and the discussion in previous sessions of this association, on this subject, have been with the object of confining the work to be done exclusively to those who are interested in electrical matters. Am I right, Mr. President, in this supposition, that the work and plan of the convention, mainly if not entirely, has been confined to those who are interested in electrical matters.

MR. STEUART: Yes, that was the case until we organized the present Bar Association at Washington, which represents diversified interests.

DR. MASON: It strikes me that it would be well to reinforce ourselves by an effort to gain the sympathy and co-operation of the different societies of engineers in this country, who are, if not equally, interested with the Electrical Association, and with electrical gentlemen, at least have a profound interest in this same question, and who would probably be glad of an opportunity to work right along in the same line with us. I wish to throw this out as a suggestion, and then to make a remark which will be rather in the form of a question. It seemed to me that at one point of the paper read to us it reflected upon the intelligence or the culture, at least, of the examiners and assistant examiners in the Patent Office. I would suggest that a thorough acquaintance with the history of the men, who are now the examiners and assistant examiners in the office would develop the fact that a large proportion, if not the majority of the examiners and assistant examiners, either have been admitted to practice at the bar, or have been graduated in schools of law. I wish to throw this out as a suggestion. I think it might be as well, in a paper issued by us, not to reflect upon either the intelligence or the culture of the board of examiners and assistant examiners.

THE PRESIDENT: I do not see how you can present a paper in this association without reflecting upon them. If there is nothing wrong, then there is nothing to right.

DR. MASON: We might reflect upon the system, but not upon these gentlemen.

THE PRESIDENT: Perhaps that is so: but I think that you will have to reflect upon both of them before you get through.

MR. LEGGETT: I dislike to arise in opposition to a measure of this character, but, from the very outset of this action on the part of this association, it has struck me as a piece of very bad wisdom—a thing which we ought, in a very quiet way, to abandon. Now, these questions, every one of them which were raised by Mr. Steuart in his article (a very excellent article) are questions which affect not electric light companies, but the manufacturers of electrical apparatus. There is scarcely a manufacturer in this country, but what is willing and anxious perhaps to change certain features of the patent law; and yet I doubt very much, from the experience which I personally have had with manufacturing interests, that they desire the system to be attacked in a general way. We have a patent system which is by far the best of any system on the face of the earth. There is no question about that. Canada has followed it, and has made a patent law almost identical with ours. England, which has had a patent system for one hundred and fifty years, and perhaps longer than that, has followed ours within the last three or four years, and has patterned almost word for word the principal sections of our Patent Law. Germany, advanced in all these matters of patent law, and in material interests of this character, has followed, within the last three or four years with a new patent law, based almost word for word upon ours. And so Belgium is seeking the same pattern to copy from. Now the result of the patent law of this country has been the development of industries of such great magnitude, that it has been copied in the laws of all nations; for all nations are coming to adopt the same basis in this matter, and it therefore seems to me very bad policy at this period, when there is agitation against certain features of the patent law, to raise the issues which are now suggested. Many of you will recollect the action which was had a few years ago, on what was termed Bill 300; and at that time, as some of you may recollect, a Bar Association was formed in the city of Washington with a view of dealing with this matter. It may have gone into a condition of "innocuous desuetude," but I think it was never formally abandoned. That association, it is safe to say, together with ramifications throughout the industries of this country was able to collect and expend probably a hundred thousand dollars at that time in an effort to amend the patent laws. Every feature which is here raised was raised at that time, I think, without exception. The Bill passed into the House and into the Senate, but there was no possibility of getting it through. Now, I know that there are certain features which have crept into our patent system, and which frequently have been the subject of inquiry, and doubtless will continue to be among the difficulties of the system, and one of them is how to remedy suits against users. That is where the prejudice had arisen all over this country. The drive-well suits, of which thousands were brought throughout the country, and another litigation in which I was the attorney—the Birdsall-Clover Huller cases. We brought over a thousand suits in this country; and I had the pleasure of having the bees come about my ears for years in connection with those suits. It is folly to pursue the large manufacturing institutions to stop the infringements. The remedy seems to lie, in that respect, in a measure which would reach the corporations. It is a very simple thing for a manufacturer to go to patent counsel, or to proper authority, and have a search made which will determine absolutely whether the thing which he is about to make is going to infringe a patent. But, instead of doing that, the corporation takes up an invention, goes ahead and makes it, and puts the article out all over the country, and the users buy them innocently, while the real inventor is defrauded out of his rights by the fact that the whole market is taken possession of, and he cannot tackle these powerful corporations. That same matter has been corrected in other countries. In France, for instance, the infringer is punished by fine and imprisonment. First, by fine and forfeiture; and not only a forfeiture of the infringing articles themselves, but a forfeiture of the machinery and tools employed in making them, for the benefit of the patentee.

A second offense is punished by fine and imprisonment In Germany, in Belgium, in Russia and in Sweden it is the same. In Spain the measures are still more stringent. In Italy, in addition to fine and imprisonment, there is a clause to the effect that no action shall be delayed for more than one week Laws of this character making the infringement of a patent an offense punishable by fine and imprisonment, stops it at its inception. The manufacturer does not go into the business. He keeps out of it; and consequently suits against users are unknown. The protection of property in patents is recognized and enforced. Now, in order to strengthen the law of this country in that respect, it is necessary simply to build up the wall around inventors, and not tear it down. But this is a matter which affects the manufacturing interests, and not our association interests solely. It seems to me a matter in which a hundred thousand dollars was expended not later than 1877 and 1878 in a futile attempt to amend these special features of the patent law—it seems to me in such a matter that it would be poor policy for this association, where not one single interest is involved, to go ahead and expend the little money that we have on hand to seek to carry out measures of this character. I do not believe it is good policy. I do not believe the move reflects the sentiments of the different interests in this association. I think that this matter was proposed to us and carried through without sufficient thought. We are launching upon an investigation here which has no end. In the matter of promotion in the Patent Office, what have we to do with that? What have we to do with the question of the compensation of the commissioner? These things are things which the patent attorneys in associations where large manufacturing interests come together will reach a conclusion, and that conclusion will be satisfactory to all. I think, gentlemen, that when this discussion is about to end I will offer a suggestion, perhaps in the form of a motion, that this association lay this matter upon the table and expend no more money in it. I would like to hear other gentlemen express their views upon the subject, if they have any

MR. STEUART: If I may be permitted to make a remark in reply to the gentleman who has just spoken, I will do so His suggestion is that we are opening up a wide field in an apparent effort to tear down the walls of protection which surround the paten-

tee. I am sorry if I have expressed myself so obscurely. I am sorry if I have not made my meaning clear in my effort to suggest that the whole purpose of this committee, the whole purpose of the effort which has been made, has been to build up around the patentee every safeguard and every weapon of defense against infringers that could possibly be devised. That has been our purpose solely and entirely. Our effort is to protect the patentee, to strengthen his patent right, and to give to the owner of a patent a right that will be far more valuable than any right which he now possesses—and particularly in relation to electrical matters. With reference to the gentleman's suggestion as to the advantages which our system has over other systems, I wish to say that I fully appreciate those advantages. We have got the best system in the world; and those countries that have followed us—Germany, England, and Canada, particularly Germany, which has followed us most closely—have carried our system to the very point beyond us to which we want now to carry it. The last thing done by the German Government in perfecting their patent system has been to establish a court especially for patent appeals, and to put over their patent office a man who will hold his position during a long term of years sufficient to enable him to understand the practice, and to dictate proper rules to the examiners who are under him. That is what we seek. That is all that we are now seeking. It is simply to carry forward our system so as to complete it, and put it where our imitators have already gotten theirs. They have carried it beyond ours in theory. With reference to the effort which was made ten years ago to alter or amend the patent system, the gentleman has suggested that an effort was made in which a hundred thousand dollars was spent, and which was unsuccessful because, as he intimated, it was impossible to make any changes. I would like to read a clause from a letter which I have in my hand from Mr. James J Storrow, whom we all know, of the Bell Telephone Company, on that subject. He says:

"Ten years ago an attack was made upon the patent system, as you know, by an organized company of infringers. The best that my associates and I, representing a large amount of patent property and interests, could accomplish was to agree to some modifications which we thought were wise, and would tend to remove some features of the law, which we had to admit, however, were very obnoxious, and to agree in a modified form to some others that we thought would have passed in a worse form if we did not come to an agreement about them."

The facts with regard to that effort were, that it was an effort by a band of infringers who were determined to break down the patent system if they could or to introduce features into it which would enable them to use certain patented property which they wanted to use, free of charge, and free of liability for infringement A hundred thousand dollars was spent, but it was spent to a large degree in defense of the patent system against the attack of the infringers. At present we propose—although there are many suggestions made, but those suggestions are made for the purpose of gaining light upon what is the most desirable thing to do—at present we propose, and have settled down to the conclusion, as I have suggested, that we will do just what Germany has done; we will put over our Patent Office, if it can be done, a man who is thoroughly capable of managing it, and we will put an intermediate Special Court of Patent Appeals, with jurisdiction to hear the technical questions which now go into our courts, where there is, in many cases at least, an entire absence of technical knowledge We are attempting to build around the patent system, and around the patentee, a wall which will be a benefit to every member of this association. Indeed, I can hardly conceive how any association that has existed in this land could be more interested in this subject, or could more properly be said to be the right source whence efforts of this sort should spring, than this association.

DR. MOSES: Referring to the remarks of Mr. Steuart, I would like to mention an incident illustrating what the efficiency of the Superior Court in Germany is. A friend of mine, who represents a very important interest abroad for electric motors, was recently laying that motor before various manufacturers in Germany, for the purpose of uniting with them in the exploiting of the invention. He met one of the largest manufacturers—who shall be nameless, although his action should be blazoned abroad so that we may know what some men can be capable of doing when they have the power to do ill. This manufacturer said to him: "That is a very good invention, indeed; but if I want it I will use it:' in those very words. My friend, thinking that the gentleman was, so to speak, on his own hearthstone, and had the idea that perhaps he might do so, thought that he would investigate the question, and on doing so he found that this Appellate Court would not only protect him, but would take cognizance of such a remark. It is a bad spirit; it is a freebooting spirit, and ought to be repressed as much as possible. A patent represents a concrete idea, an accumulation of mental wealth that a man is entitled to hold and to have just as if it were hard dollars. He spends hard dollars in exploiting it and perfecting it, not to mention many sleepless nights. Now, if such a law as Mr. Steuart proposes can be brought forward, so that we could have such a court, there would be a greater dignity attached to our patent system. As it is, the American system, excellent in many respects, commands admiration abroad for the very thorough manner in which claims are investigated in the Patent Office. I have heard many compliments paid to it by distinguished patent lawyers. Another incident I would call to mind as showing the necessity of having a comprehensive and logical system. It is well not to touch a crumbling structure, for fear that you may precipitate ruin upon you; yet, at the same time, we put in all sorts of tie bolts, in order to keep it in position temporarily. Those tie bolts should be, in our system, an avoidance, if possible, of those extraneous matters which rather tend to weaken the confidence that the patentee has in the security of his right. A glaring instance came under my attention in England recently, where a very valuable patent, taken out by an American in England, was received most favorably, and large amounts of capital were ready to exploit it, until it was found out that a publication, which for the life of me I could not see was a publication—the sending of the American patent abroad without its being published to the world, that is, the mere act of issuing a patent threw such a cloud upon the title to the invention that it was impossible to exploit that particular apparatus. Now, those uncertainties should be removed if possible, if we have them, and they are such as Mr. Steuart referred to; such, for instance, as where the expiration of a patent abroad may limit the life of the American patent; such things as that should be investigated carefully, and if errors which have crept in cannot be corrected now, still, in the future, they might be; and it would be a very wise thing for us in some way, as a body, to call attention of the legislative branch of the Government to the fact that we are willing to cooperate with all other branches of inventors, or societies that represent inventors, in order to give a greater stability to the patent laws, and greater protection to inventors. That course, I think, is very admirably outlined by the committee who had it in charge; and I hope that we will give as much moral support as possible to those gentlemen in the very arduous, but not a thankless task, because they will have the reward of our praise, in a very arduous but most useful effort; because it will tend to give greater security to the American inventions which are now, particularly in our branch, the fundamental ones at the bottom of the greatest industry that has ever been started, and that is the electric light industry.

MR. PHELPS: I share with Mr. Steuart in his surprise, that the work of this committee, or any action of the association upon it, should be construed as being in anywise an attack upon patent protection, or the patent system. I suppose it is quite within the truth to say that the movement was conceived and started purely with the purpose of conserving all the protection that inventors now have, and are clearing up as much as possible the obscurities that exist in relation to inventors' rights, by better methods applied to certain portions of the system as now practiced. I think there can be no doubt about that. I was also a good deal surprised that any one should fail to see the very immediate and direct interest that all the members of this association, as well as manufacturers, have in this question. It seems to me, that the conclusion which exists in respect to the relations of many patents to one another, and the rights of various people with respect to one another, is a source of constant anxiety to nearly every one engaged in the electric light business. I think that the work of this committee has been fully justified, and the time spent upon it has been fully justified by the results that have been reached up to this time. If I understand our position now, we are expected to pass upon the suggestions made by the committee, for I suppose that the remarks of Mr. Steuart, made after reading the report of the committee as presented in the printed pamphlet, are to be considered also as the report. The opposition, as I understand it, is, to entirely abandon the idea of the creation of a commission, and instead of that, to direct the energies of the Bar Association of Washington, supported by an expression of opinion as evidenced by a vote of this association, towards the accomplishment of two distinct measures: The creation of an appellate court, and the increase of the salary of the Commissioner of Patents; both of those measures seem to me to be quite free from the objections which would attach to any measure which visibly showed the object to be the increasing of protection to patentees. I am very glad that the committee, and probably all the members of the association, or a large portion of them, have recognized the danger of introducing any measure which should seem obviously to be addressed to the increasing of the value of patent monopolies in a money sense; but these measures simply look to conserving the rights and the protection now afforded by our patent system, by a modification of the methods of administering patent laws. The measures suggested, as they seem to me, do not afford an opportunity for attacks upon our patent system, and it would be difficult to make amendments to either of those propositions which would attack the patent system. Therefore I trust that the association will see fit to endorse the proposition of the committee as I now understand it to be.

FIG. 3.—STORAGE BATTERY PLANT IN THE ELECTRIC CLUB.

MR LEGGETT: I think I may be misunderstood, if it is assumed that I assume that the action of this committee is in the nature of an attack upon the patent system. I do not consider it in any way, shape or manner. I think that the recommendations of the committee, in most respects, are good, and that they will correct abuses in the particular channels indicated. The point with me is simply this: Is it policy for this association to divert its funds (which are very limited, to say the least, although we now have a proposition before us to double our dues, in order to carry on our business properly) is it policy for us as an association to divert our funds into another channel? Now, if there are people here in this association who desire to further the ends suggested, if there be manufacturers with us who have those ends at heart, and if it is for their advantage that these recommendations should be carried out, let them act personally and individually to advance the object which they desire; let them join this movement; let them divert their own funds into that channel; but, of what earthly use is it to any electric light company to interfere with these matters in the patent office? It seems to me that there is no interest in this country that has been so well served in the patent office as the electric interest. I do not think that a set of patents has ever been issued in any country that will compare with the electrical patents which have been issued in this country. Why, the Bell telephone patent—a patent obtained from our patent office—has withstood attacks in all the courts of this country; and even an action by the Government itself to annul it cannot reach it. If we look at the foundation patents of the electric light companies we find that they also are very admirably drawn. All of these inventions right straight through, so far as the electric interests are concerned, have been conserved in the patent office, right straight from the very beginning to the end. The only point I make in this matter is that as an association let us simply suspend our operations at this point, and recommend if necessary, or if thought desirable that the individual members of the association be requested to lend their efforts, so that the association funds may remain intact for the association. If this thing is to go on you will need to spend thousands and perhaps tens of thousands of dollars before you will know where you will stand. I recollect that at the time Bill No. 300 was under consideration that a party gave me sixty dollars a day for more than two months to remain in Washington and look after their interests in connection with that bill; and it was not very large compensation either. I know of attorneys in this country who are paid two or three hundred per day for four or six months—Mr. Starrow for instance, who represented large interests at that time. While it is true that there was an attack by an organized band of infringers, still it was based upon those defects in the patent law, and thereupon the patent association got together, not to attack this band of infringers, but to correct the features of the patent law which were present. We are not called upon to-day, and there is no reason why we should fear any attack upon the patent system. We are not here to protect or to attack our patent system. As an association we have not been called upon to do that; and I do not believe as an association that we have got to go into that matter; for that will still be attended to by patent attorneys, and by those who are more directly interested in patent matters. Every interest of the kind in this country is represented and looked after by those who are prosecuting these matters in the patent office, and their expenses are sufficiently paid for the purpose. From the reports of every commissioner for years past, away back at least to the time of Commissioner Mason, every commissioner has recommended, right straight through, the reformations which are suggested in patent matters. It is not a new thing. They have been striving year after year, since that time, to accomplish these purposes; and I do not think we ought to stand up here now and take the brunt of that thing, and pay from our association fund the money necessary to carry such measures through. I simply suggest that as matter of policy—that, as an association, we drop this matter except so far as our recommendation goes, and then, as individuals, let us carry it so far as each individual interest deems it to be appropriated.

THE PRESIDENT: Up to the present time the money expended by the Legal Committee has not been taken from the funds of the association, but has been contributed by voluntary subscription by the representatives of different interests; and there is now remaining of that special fund about $250.

MR. DECAMP: That appropriation was made for two purposes—to meet the expenses of the committee, and to procure the publication of our proceedings. The fund which was contributed for those special purposes has already been half expended; the balance is in hand for use for that purpose. If Mr. Leggett will allow me, while I am on my feet, I will say that while I am in entire sympathy with the revision of these laws, as stated by Mr. Steuart, I think that we are taking hold of something that we cannot carry out. I think that we will find that the fund required for that purpose will be very largely in excess of what we are able to pay, the small balance of $250, which remains out of that small contribution, is sufficient, probably, to pay the expenses which have already been incurred, and to meet bills to be presented for outlays which have been made. I, for one, do not see how you can carry it any further with our finances as they now stand

MR. GARRATT: We are undoubtedly much impressed with the arguments which have been advanced, and especially by the statement of the large fees which patent experts have received. It does not seem to me, however, that this is the time to abandon this particular subject. It was my misfortune not to have been here when the discussion was opened; and there is one fact which may then have been mentioned, but which I wish again to mention, but without making any argument upon it; and that is that on the 20th of last month there was presented to Congress a bill drafted for the special purpose of wiping away our present patent system as it now exists, and going back to the patent law as it was in 1796. It does not seem to me appropriate that, with the interests which we have at stake, we should be inactive in this matter. I own a

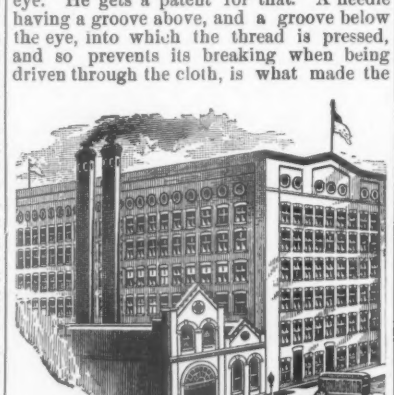
good many patents; I do not know as they are worth anything, but yet I feel that I have some interest in this matter. It is argued that we are here for no particular interest; but we may some day be fortunate enough to get hold of something which is worth something; and it does not seem to me to be wise to drop this matter. It has been argued that it will take a large amount of money. It has been argued that suitable experts must be remunerated in a way not commensurate with our means. I would remind the association—and I do not do it because the head of the patent department of this association happens to be a friend of mine—that there has been very much work done here which has cost the association not one cent. It is a common custom for those at the head of a committee to do nine-tenths of the work, and to do it without remuneration. There are other committees, or have been in this association, composed of gentlemen whom you well know have been called upon to devote long, hard, persistent work—professional work—without remuneration, which otherwise would have been paid for; but the service has been given as freely as the wind blows over this house. I have no doubt that if it is the opinion of this convention that this movement should go on, the funds will be forthcoming which will not leave this association under any great incumbrance of debt. This bill which I speak of as being now before Congress I do not think will amount to much, because I happen to know that at the present time it is not backed with very much power; it might be. It is a bill which might be promoted by an organized system of infringers, the same as the previous effort which was made some ten or more years ago; and it might then become an element of very great danger to us all. I do not want to see a blanket of cold water thrown over this movement in the face of facts as they now stand. There is one more point to which I wish to refer. There has been an argument advanced here this morning that the electrical interests have been advanced by the patent system as much as any other interest. That argume nt was followed by a syllogism; but that syllogism was a false one, logically. I do not cast any imputation upon the intent of the man who advanced it; but electrical patents and electric light patents were used as one term of the syllogism interchangeably. Such logic as that is not permitted in courts, and ought not to be permitted before this association.

THE PRESIDENT: There is one point that I want to say something about in this connection. I do not know anything about the legal phases of this question, nor about any of those outlying ramifications which have been discussed by the gentlemen who have spoken on this matter. That which I wish to call attention to is the fact, which has not been commented upon by any of the speakers, and that is that the men who are using these patents—the men who have paid their money for these patents—have found them, in a great many instances, absolutely worthless. Now, there were patents and there are patents; and while Mr. Leggett has held up to you the wonderful success of the Bell telephone, which I believe has had more piratical attempts upon it because of its success than any other patent ever obtained in this country—while he has held up this thing, he has brought in, collaterally, the protection which has been afforded to our business. Now I maintain that a proper system in the patent office (and I want you to think this over after awhile) would make a patent, issued from that office, just as good as gold—if the system was proper, and if proper safeguards were thrown about it. I want also to make this statement—that throughout this broad land, where millions of millions of dollars have been invested in the electric lighting business, there have been very few, if any, favorable decisions in the courts of this country in electric light patent suits. I am inclined to draw it very mildly. I do not want to make any extreme statements. I know that when I get to talking I generally put the bad end foremost; for I want to make my case as easy as I can. The result of that has been—what? It has been that the promotors of electric light companies go into various communities in which they live and solicit their fellow citizens to put their money into the electric light company. When you deal with a parent company its representatives will say to you, "We have the foundation patents; we have property here; we are not offering you a paper upon which is written down a number of set phrases and words, but we are offering to you something which is just as good as gold, because we are going to take your gold for it." But what has been the history of these cases? I do not want to reflect upon any representatives of parent companies who are here, but the melaucholy fact stares us in the face—melancholy to those who have put their money into electric lighting companies and have got no return from it—the melancholy fact stares us in the face that infringers—men whom they claimed, when they were selling their patents, were infringers—came into your territory and established themselves, cheek by jowl, with you; and the result was that you found yourself, in a few months, doing business for nothing, and a promised decision in court was never delivered. Decisions are rarely ever reached in electric light patent suits. Therefore the purchaser of the patent suffers. The parent company, with all this gilt edge work thrown about its business, sells you what? It sells you these patents. Why do you buy them? You think that you are investing in a property which will bring you a good return for your investment. But what do you find? You find that there is no punishment for the so-called infringers. You find that your patents are comparatively worthless. Why is this? Surely the inventor believes and has faith in his invention; surely the men who make these representations to you are in earnest; they are honest; and they believe what they tell you. But that which they tell you is not true. The stern logical facts and bitter experience which has buried electric light company after electric light company, which has gone down in darkness and financial ruin, are the tombstones all along this road which show where the contents of men's pocket-books have been scattered by the way. Where is the fault? If the fault is not with the men who have urged you to buy their wares, it must be in the Patent Office. These are the conclusions which law men come to. These are not the conclusions of the lawyer; but they are the stern conclusions which those who have lost their money, sinking it in these speculations—that is the word—speculations, when they thought that they were engaging in a fixed and substantial business; it is the stern conclusion which these gentlemen come to that have invested and lost their money—that there is something wrong in the Patent Office. I am not speaking for men who possess a patent incubator, or for the man who has a patent plow, or a patent harrow, or a patent washing machine, or a patent cider press. Because I permit to each of them the same liberty of speech and action which I ask for this association, and for its members individually; but I say that what we want to do is to protect our own interests as far as lies in our power; and we cannot protect them by sitting idly by and seeing this thing going on. We must act. I want to refer to the lawyers once more; but I do not want to do it unkindly or have them think that what I say is intended as a reflection upon them individually. If there were no sick men there would be no need of doctors. If there were no imperfect laws there would be no need of lawyers. [Applause.] And just as far as you protect the work of the Patent Office, just so far as honest safeguards can be thrown around these papers which are reached with the broad seal of our country upon them as the signs of protection to men who have invested their time, their money and labor in bringing out something for the benefit of mankind, and incidentally for their own pockets as a matter of course—just so far as these things can be remedied, just so far is Othello's occupation gone; and the lawyers' who have nothing to do. [Laughter.] Perfect the patent laws and there will be no use for patent lawyers. I am talking outside of lawyers, and in the interest of this association and the members of this association. And I say that the paltry dole that you spend in aiding this legal committee—whether it be $250 or $5,000, would be money well spent if it only succeeded in bringing before Congress a discussion of this thing, so as to lay bare the impositions which have been laid upon inventors and investors, and the frauds which have been perpetrated upon men who have invested their money in patents. [Applause.]

MR. LEGGETT: I do not see that the remarks of our worthy president alter the condition of the facts at all. The suggestion was made by the gentleman upon my left that good laws will not stop litigations. Good laws are just as easily infringed as bad laws. The fact that a law is good does not stop the breaking of it by this or that individual. It can be broken just as much whether it is a good or a bad law. It all comes back to the old proposition—what have we to do with it? Where are we materially injured in this matter? Not by the fact that the Patent Office, seeing that we have a good invention, gives us a pa'ent for it; not by the fact that the Thomson Houston Company comes along a while after and induces the Patent Office to give them a patent for an improvement on our invention. The suggestion was made by our worthy president, because the Patent Office issued a patent it ought to stand still and never issue another patent which would infringe it. That, it strikes me, would be the very worst policy in the wide world. It would be suicidal. Where would it have left the sewing machine? It would have left the sewing machine with the Elias Howe invention—a needle with the eye at the point and with mechanism which could not drive it through a hundred stitches. That is exactly as the sewing machine would have been left at that time. What followed right after that? Another man came after, who saw that the cause of the breaking of the thread was the fact that, as the needle passed through the cloth, taking the thread with it, it made a larger hole, and thus an abrasion was thrown upon the thread and it broke. What was the next thing done? There came along a man who made a little groove above the eye of the needle, so that as the thread passed down through the cloth the thread lay in the groove. What would have been the result if the first patent had stood in the way of all improvements on the sewing machine?

THE PRESIDENT: Let me say a word. There was nothing in my remarks intended to prevent anybody from making improvements upon base patents.

MR. LEGGETT: I concede that; but is not that just exactly the situation which throws these competitors into our market? It is precisely that and nothing more. That man came out with a sewing machine having the eye in the point, but no groove. Another man makes a groove above the point and nothing more. But that was not enough to procure a perfect machine. It occurs to another man to make a groove right below the eye. He gets a patent for that. A needle having a groove above, and a groove below the eye, into which the thread is pressed, and so prevents its breaking when being driven through the cloth, is what made the



STATION OF THE EAST RIVER ELECTRIC LIGHTING COMPANY, NEW YORK.

machine a success, and makes the perfect sewing machine of the present day. Who is entitled to the credit of that invention? Not the first man entirely. The fact that every machine which the subsequent inventor makes infringes every patent which has gone ahead of him, makes no difference. It is for the law to get at that. The law is not defective which gives to the second and third man a patent. It is just so with our electric light plants. The Brush Company came into the field first with patents which were practically the ground patents, and shortly afterwards came the Weston, Thomson-Houston, Farmer, and others. Each one of them had something which was regarded as an improvement by him, a patentable improvement, over some things that had gone before. And the Patent Office gave each of them patents. That was all that the Patent Office can do. It is perfectly proper that it should do this, and not to give a patent which would cover all future inventions in the line. These patents came out; and they established electric light plants. Now, the law is brought into play to invoke protection of these ground patents. Now it is asked, what has the law done for us? Why has there never been a decision sustaining an electric light patent? Simply because, as I will venture to say, there never has been but one patent suit involving the electric light system which has been brought to a conclusion, and that is the one which I suppose is referred to. That was the annular clamp of the Brush electric lamp, which was defeated at Hartford, which will soon be heard on appeal in the Supreme Court. Why was it defeated? Not because the patent law was bad, but because the patent law was good. It was, to be sure, decided upon a point which had not been argued, and if argued, a result might have been different. If anticipated by another party it should be defeated; and that question is the very one to be determined by the Supreme Court. Our patent laws, as I have said before, are in good shape. There are certain things which need modification and change—certain things by which change would greatly improve them doubtless; but it seems to be folly for us to divert the funds of this association in a channel which will take care of itself. There is no danger of this bill which my friend referred to—a bill giving to the user the right to use a thing if he is an innocent purchaser, being enacted: it is contrary to the constitution. The same matter has been before the Senate of the United States time and time again. Unconstitutional measures are seldom passed by the Senate of the United States. They stop before they reach that point. We have a right to expect that the law-makers of the nation will take care of those things when they come properly before them. All these little things, such as this, frighten nobody, for they amount to nothing. Such a bill will probably never get through the committee even, because the committee generally has a good constitutional lawyer upon it. It is a bugaboo. I simply reiterate the statement which I made before, that we ought not, as an association, to do more than express our opinion. When it comes to individual action, then let each one act for himself, and contribute as much as he sees fit.

MR. FOOTE: Your remarks, Mr. President, about the enactment of an ideal law, or a perfect law, calls to my mind the fact that some years ago, a person who has been said to be pretty wise, wrote on a tablet of stone, a perfect law: "Thou shalt not steal." Now, if that law had the power within itself to give the protection which you seem to think will come from a perfect law, there would be no need of lawyers in the country now. [Laughter.] I do not expect, gentlemen, that we can get from a committee any greater wisdom than was supposed to belong to those who made that law; and, therefore, we need not expect any more perfect law than that. While I am in sympathy of objects sought to be gained by this movement, I am also entirely in sympathy with Mr Leggett in his objection to the method taken to gain that end. I think, as an electric light association, that we are putting ourselves before the public somewhat in the light of a family quarrel among electric light people on this patent issue. If the patent laws need amending, if there is any improvement to be had in that respect, we must remember that we are only a small portion of the public who are interested in patents, and who will be interested in any movement having that object in view. I think that the question should be brought forward by the owners of patents, and not by the electric light interest only. There is somewhat of a tendency in the public mind, even now, to oppose monopolies in electric lighting, as in telephones; and if we take up the issue individually, we are liable to enhance that feeling rather than to allay it. Therefore, I think that we ought simply to recommend that an association be formed, representing all the owners of patents; and that this association, as an association, take no further action in the case.

MR. DUNCAN: The matter presents itself to my mind in this way: The action of this body, so far, has been simply this: they have organized a committee to take in hand the subject matter that has been under discussion this morning. They did not authorize that committee to spend a single cent of the funds of this association, but we did say to that committee, "We give you the moral support, the moral backing of this association. We believe that it will be a good thing not only that this association shall be at your back, but we authorize your legal committee to go outside and to interest other parties in bearing the brunt of the financial fight which will have to be made." That is the action of this association up to the present time. Your committee has made its report. This committee states that they have not spent a single cent of the general funds of this association, but they have asked for voluntary contributions from parties who are interested in this matter, and that they have received meager responses to that appeal; that they have spent judiciously as well the amount of money that has been put at their disposal, and that they have in their treasury $250 to be used in further efforts. The simple question now presents itself to this association, "Will they still further support their committee in the efforts which they have made, or will they lay the whole question upon the table, as has been suggested? What would be the wisest course to take? If this association is convinced, as a body, that as individual members they have an interest in this matter, then they have a right to subscribe toward the purposes which that committee has in view; that there is no obligation upon this association to financially back up this committee; and that they simply use the legal committee of this association as an organized committee to obtain support outside, as well as their own individual efforts in that direction—then what is the wisest method of procedure? Is it to stop right in the middle of the effort which is being made, and compel the committee to say to the people whom they have attempted to interest in this matter, "We have gone so far and our association has no backbone; they do not believe in this thing, and they have laid this matter upon the table"? Or, will the association by a vote approve the course of its committee in the past, telling it to go on as individual members, and we will aid them, or will the association simply lay the whole question on the table? That is the way the matter presents itself to my mind.

MR LEGGETT: I offer the following:

Resolved, First, That the matter of patent legislation be discontinued, so far as relates to any action by this association as a whole, and that it be confined to an expression of opinion. Second, That the association funds be not diverted to that end.

MR. DUNCAN: I move, as an amendment, that the whole question be brought to a direct issue; that the report of the committee be approved; that the legal committee be continued, with the proviso, "but without expense to the association."

This was agreed to.

Economic Value of Steam Pressure Records.

By Jarvis B. Edson, M. E., of New York, Before the Electric Light Convention, Pittsburgh, Feb. 22.

The engineer of the present century begins his operations based upon the pressure of steam he is capable of maintaining in his steam boiler. From this he extends his calculations, and elaborates his plans for the prosecution of his work. It matters not what the problem may be—whether it is the grain to be threshed, grist to be ground, hill leveled or mountain pierced, ore raised or office reached, ocean plowed or continent crossed—the same agent performs them all. The tropical fruit while rushed to a Northern market is also cooled by it, and the plethoric meat of the Western plain is refrigerated during its trans-continental run, till finally we see the coal transformed into heat, then into steam, and manifesting itself in work, in its production of coal exemplifying the beautiful law of the conservation of energy, and making us thankful for the birth of steam. At present the civilized world is lighted by it, and searching for one greater than Faraday who shall give us a substitute, and sound the death-knell of steam. So meanwhile we reconcile ourselves to the loss passing up the chimney, and stand aghast when the boiler "lets go," scattering death and destruction in its wake, and simply conclude with a verdict of "nobody to blame."

Investigation and scientific study have done much, however, both for the construction and the safe and economical management of steam boilers. Mystery no longer accounts for boiler explosions, for the conclusion has been reached that "the causes of such accidents can be wholly prevented and controlled," and ignorance is becoming dethroned in her management, to make way for the more intelligent methods of boiler management. The men from our colleges and technical schools demand the facts, that they may proceed to their conclusions. Not theirs to view the one hundred victims of a "Westfield" explosion with "nobody to blame;" for it is not they who beat upon pans, and blow horns, to scare off the devil when the sun darkens. The solar eclipse to them was calculated upon and predicted in advance of its coming. Their verdict will always be, "Somebody is to blame; explosions are caused by ignorance or neglect."

And so with economy; for to them the furnace will be a sort of gas retort, and the burning of coal a scientific study. To them the boiler is a giant struggling against almost equal odds, harassed by conflicting expansions and contractions, constant and varying strains attacked by corrosion, and injured by scale. They will know it as a magazine of enormous power, in which each cubic foot of water has the explosive energy stored within it of a pound of gunpowder, and to them eternal vigilance will be the price of safety. Certainly, then, it does appear strange that for such a charge we should employ cheap labor, and that the most ignorant man about the establishment is the favorite fireman. For my part, it is incomprehensible how either practical men or those of the usual amount of business sagacity can feel willing to discount the chances against such a course.

Nevertheless, the engineer of to-day is confronted with these conditions, and the safety and economy of his "plant" become of imperative importance to his success. In these two connections, then, I desire for a few moments the indulgence of your attention, with a view to submitting to your judgment certain facts bearing upon the importance of providing some method whereby a surveillance over the steam pressure may be had, for accurate and full information as to the management of our boilers should always prove useful and interesting.

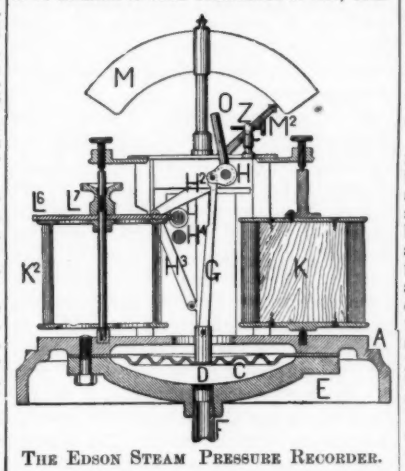
Upon the question of safety, it requires no demonstration to prove that whatever impairs the boiler's strength or durability should be prevented.

To make such prevention possible, however, presupposes the means whereby the preventable occurrences may become known. If, therefore, fluctuating or excessive steam pressures are injurious, how are we to be made aware of their occurrence?

Obviously but one method exists, and that is the resort to automatically steam-written records of them, and from which we can determine the departure from conservative limits. Assuming that the ordinary steam gauge, which only indicates the pressure at the instant, is entitled to the great confidence bestowed upon it, it undeniably lacks the ability to afford us any more information as to the pressure of the previous moment than the proverbial dead man who can tell no tales. In fact, for many years, owing to sharp competition, they have been so poorly constructed as to be even dangerous to use, so liable are many to rely upon them for the determination of the pressure they are at the time carrying, even going so far as to adjust their safety-valve weights to blow with the gauge. The dials are first produced by different methods, in large quantities, all alike, and the springs taken afterward which will come the nearest to the "travel" called for by the dial so laid out; whereas each spring has its own "travel;" and its dial should be laid off accordingly, and a suitable price demanded for the article when made, as a cheap and unreliable steam gauge is dangerous and dear at any price.

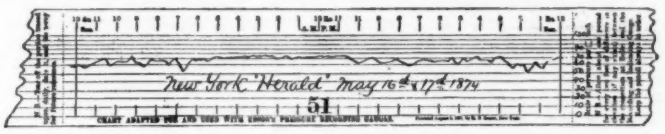
When, however, only one of these is relied upon for twenty years, it is apt to be considerably out. Last month I came across one such in a State hospital, which was some ten pounds out, and in which case the pipe leading to it was stopped up by dirt, etc., so the pressure rose and fell, not with the pressure on the boiler, but as soon after change occurred as the condensed steam—"water"—could soak through the obstruction.

Instead, therefore, of relying solely upon the ordinary indicating instrument, whether it be entitled to such confidence or not, common prudence would dictate the employment of more than one gauge, and preferably that the supernumerary should be a recording machine.



The Edson Steam Pressure Recorder.

The records of steam pressure carried have a large prudential value, for the reason that, with their use a fireman must give up his position, or do what he is required to do. For instance, if a careless man lets his steam get too high before he discovers it, and the "safety-valve" (?) does not blow as calculated upon, from any of the causes common in such cases, who other than the fireman will be any the wiser? and when will the remedy for a careless fireman, or faulty or overloaded safety-valve, be applied?



Record from N. Y. "Herald" Office.

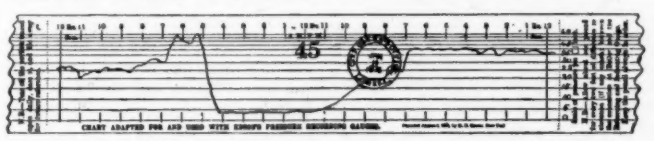
It is generally supposed to be necessary to first *know* of a trouble before its remedy can be either determined or applied.

The only way, therefore, to know whether one's boilers are being exposed to excessive pressure or not, is to use a gauge which records the pressure.

Occurrences are constantly taking place under that smooth-sounding term "banked fires," which would electrify every hair of one's head if revealed to those who have so much at stake, and think such a fire harmless. A strong fire towards stopping time leaves the boiler setting so hot as to supply sufficient heat for running up the pressure beyond what a cold setting could do. Yet, when the fires are once "banked," the man "lets up" on his watchfulness, and generally the boiler is left entirely alone for a long interval. "We never carry steam at night, as we bank our fires, and in the daytime have a good, careful man around," is an expression common to most steam users; but a few moments will generally convince them that they have assumed a very ridiculous and untenable position. The police of our cities frequently find steam blowing off from a boiler under the sidewalk during their night perambulations, and have learned that it means one of those places where they "never carry steam at night;" and he routs out somebody in the building or neighborhood to remedy trouble. One summer recently, while stopping in a manufacturing town, I heard a shrill whistle blow for two or three hours during the night, and concluded, as I learned the following morning, that it was a low-water alarm. The police hunted up an engineer to go to the establishment and give the boiler some water; and, fortunately, the boiler took the engineer's proffered kindness without getting up and going off out of shape about it, either.

Even so important a matter as the amount of pressure applied by an authorized inspector in testing a boiler with hot water, has shown that only an excess of eight pounds was put upon an old boiler which is regularly carrying from fifty-five to sixty pounds' pressure of steam. The record further shows the pressure to have been "jumped on" for an instant, and then released, allowing no time for careful inspection of the seams, etc., while under the testing pressure. No satisfactory reason has been obtained, so far, for this improper method of testing; but the *fact* has been established, and so much gained. Certainly more confidence could be reposed in a test where the record shows that the boiler sustained the testing pressure for five or ten minutes, and during which time the testing engineer could be presumed to have been examining the boiler for evidence of effect under such strain.

Another matter revealed frequently by the recording gauge chart is the habit indulged in by many attendants, called "bottling up steam." The most frequent occurrence of such habits takes place at a few moments before the starting time in the morning, and at noon, and in some cases just before cleaning fires. Of course such prejudicial habits are the simple outgrowth of ignorance concerning the limited amount of steam in quantity they can so bottle up, and the very small service it can render, compared with the injury such practice, when persisted in, ultimately does the boiler. Aside from this objection, the habit is exceedingly pernicious, because only a few moments neglected would cause the pressure to accumulate to the point at which the safety-valve is supposed to open; then, if it happens to be inoperative, an accident is almost certain to follow. No excuse should be taken in any shape, under any kind of reasoning, for "bottling up steam." If the generating capacity of the boiler is not equal to the current demand, it cannot be helped by simply bottling up; in fact, it has been my experience, that, where the record line has been extremely crooked upon the first introduction of the recorder, the effect of such record has been to cause a much more uniform line from day to day, until the nearest approach to uniformity had been reached, consistent with the vicissitudes of the demands for steam. A steam user once apologized for the appearance of his record, saying that the steam was drawn from the boiler at irregular periods by persons in the mill, and consequently the fireman could not carry any very regular line; that his use of steam was different from that in most places, etc. Noticing, apparently, my incredulity, he asked if I disagreed with him. My reply was, "Do you suppose that the steam necessarily falls as low as this record indicates?" In other words, I called his attention to the fact, that, where a fireman is on the keen lookout for his boiler pressure and water level, he will readily detect the pointer hand of his gauge the moment it begins to rise or fall, and govern himself accordingly. For instance, if he sees the hand indicating that the pressure is falling, he will avail himself of the opportunity to slow down his feed, and perhaps open his damper wider, and, if his fires are in prime condition, withhold fresh coal for a few moments; then, when the onslaught upon his boiler has ceased, and the hand of his gauge is stationary, or starts to move upwardly, he will at once set about it to replenish his coal and water, and so have his conditions favorable in a few moments for another attack upon his steam supply. When his steam is rising, he can afford to feed and to fire, and his thought should be to have everything in prime condition while he has surplus power and opportunity. Then he would not be caught so badly when these extreme attacks were made upon him. The cause of these extreme fluctuations, then, are largely due to the fact of his being unprepared to meet these emergencies, and becoming alarmed when his steam has fallen twenty or thirty pounds, he attempts to get it up by replenishing his fire, as it seriously needs it, with coal, which only tends for the time being to reduce the pressure still more, until it has been capable of delivering its gases, ready for combustion. After this little explanation, the proprietor shook his head, and said he never had thought of it in that light, and that he would have to call John to him, and have a talk with him. Now, the result of this was, that from that time on, the man's records never flucuated in the same manner again, and the average steam line maintained was one which showed constant attention to firing frequently in small quantities, and keeping himself in shape to meet these emergencies. Undoubtedly, the man had to work a little harder at first, but afterwards it was easier when he properly understood the matter, and manipulated his fires accordingly. The suggestion from the proprietor was exceedingly valuable. It resulted in the proprietor teaching his man, and in mutual regard between them afterwards, because it showed that the man was capable of being taught, and also willing to be, and that the proprietor had evidence of the resulting fidelity.



Record taken from County Court House, Lowell, Mass.

The dissemination of knowledge among firemen can certainly do no harm, and when it reaches a man who desires to hold his position, and give satisfaction, it will do much good. Men uneducated to the science of what constitutes firing steam boilers, can hardly be expected to use that knowledge which others possess professionally. Some men will fill a furnace full of coal, so as to have more time to walk around; then after a time up goes the steam pressure, because more heat is generated than is wanted; then the feed water is turned on, and the water level run up so as to keep the steam pressure down; the safety-valves may blow or not, the damper is closed, the fires smoulder, large quantities of oxide carbonic gas go up the chimney, and this means an escape of uncousumed fuel, which means dollars and cents. After a while the fires burn lower, and down goes the steam—helped down, it may be, by another dose of coal and so we can imagine the final effect upon boilers used in such a manner. The position of a fireman may be considered an humble one by some folks, but he is a man, for all that, and his pride in what he can do is a stronger spur than anything else. Let him see that you care for what he is doing, and take a careful interest in his work, and let him understand furthermore that his own grading depends upon himself, as established by his records; then you are in a fair way to have confidence in your man and in your safety, and also feel assured of economy of fuel. But eventually you must pay him what he is worth. If not, some one else will be glad to have him. Suppose, for instance, a man who burns three tons of coal a day is paid two dollars for such service, and that in so doing he is wasting as little as ten per cent. If coal costs four dollars and a half per ton, the loss will be one dollar and thirty-five cents per day, or what is equivalent to paying a man three dollars and thirty-five cents per day who can save this amount; but when amounts of, say, eight thousand tons per month are used, the saving of only ten per cent amounts to eighty dollars per day, and a small portion of which, if offered as a premium to the men who use the coal, would go a long way towards saving the remainder of this money. What is wanted is the maximum of steam per dollar's worth of coal burned. Much can be saved by the manner of its use, and it is within limits furthermore to say that from five to ten per cent. is commonly wasted, while from thirty to forty per cent. is not unfrequently gotten rid of by firemen not qualified as such, and entirely ignorant or indifferent regarding the science of complete combustion. Certainly it is of vastly more importance to a proprietor, both on a score of safety and economy, that his fireman shall be a man trained in the art of properly burning the fuel supplied him, than that his engineer shall know particularly if the latter does not impart the information to the fireman. The practical value, therefore, of the steam record is, in this connection, that it compels the fireman to give close attention, maintain uniform water level and uniform steam; and these cannot be had with anything short of the closest scrutiny, which means economy of fuel, and safety as well. The explanation of the charts has given much information touching unexpected occurrences, but innumerable other instances might be recited which would only tend to exhibit the surprisingly large number of unsuspected occurrences possible wherever steam is used; and as these facts become more generally known to those who are not at present deriving the information from such instruments, their use will be extended, and more correct methods of caring for steam boilers under pressure will be inaugurated, ultimately resulting in not only greater economy of fuel, but in a greater degree of immunity from those disastrous explosions which destroy so many lives and so much property annually.

ELECTRICAL REVIEW

Published at 13 Park Row,
P. O. BOX 3329.

GEO. WORTHINGTON, - - - Editor
CHARLES W. PRICE, Associate "
T. J. MCTIGHE, Electrician and Manager Patent Bureau.
LOREN N. DOWNS, President.
ANDREW J. DAM, - Vice-Pres't and Treas.
C. C. HASKINS, Consulting Electrician.

REGISTERED CABLE ADDRESS:
"Electview," New York.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.

Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

DEALERS SUPPLIED BY

The Albany News Company, Albany, N. Y.
The American News Company, New York, N. Y.
The Baltimore News Company, Baltimore, Md.
The Brooklyn News Company, Brooklyn, N. Y.
The Central News Company, Philadelphia, Pa.
The Cincinnati News Company, Cincinnati, Ohio.
The Cleveland News Company, Cleveland, Ohio.
The Colorado News Company, Denver, Colorado.
The Detroit News Company, Detroit, Mich.
The International News Company, New York, N. Y.
The Minnesota News Company, St. Paul, Minn.
The Montreal News Company, Montreal, Canada.
The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
The New England News Company, Boston, Mass.
The New Orleans News Company, New Orleans, La.
The New York News Company, New York, N. Y.
The Northern News Company, Troy, N. Y.
The Omaha News Company, Omaha, Neb.
The Pittsburgh News Company, Pittsburgh, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Co., San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Co., Toronto, Ontario, Canada.
The Toronto News Co., Clifton, Ontario, Canada.
The Union News Company, New York, N. Y.
The Washington News Company, Washington, D. C.
The Western News Company, Chicago, Ill.
The Williamsburgh News Co., Brooklyn, E. D., N. Y.

EDITORIAL ANNOUNCEMENT.

Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill., will represent the REVIEW in the West.

NEW YORK, MARCH 10, 1888.

CONTENTS.

	PAGE
A Most Creditable Electric Light Installation	1
The Simplex Tree Insulator	1
Another Interesting Description of the New Electrical Headquarters	1
Electric Accident Preventer	1
Patent Legislation. Discussion by the National Electric Light Association	2, 3, 4
Economic Value of Steam Pressure Records. By Jarvis B. Edson, M. E.	5
Book Reviews	6
The Unexpected as a Source of Invention	6
Personal	6
Bunnell & Co.'s Large Factory Burned	6
The Past Year's Work of the Patent Office	7
Electric Light Convention Echoes	7
The East River Electric Light Station	7
The Electro-Automatic Transit Company of Baltimore	8
A Human Incandescent Light	8
Electric Light for Fifth Avenue Stages	8
Mother Swan's Telegraph	8
The Cleveland Leader Answered	9
Telephonic News	9
Electric Light News	10
Organization of the Mitchell Vance Co	10
The Minneapolis Electric Club	10
The Wells Machine for Cleaning Horses	10
Electricity as a Disinfectant of Sewage	10
Electrical Patents	11

After the convention always come the "Echoes."

The city of New Orleans, by an ordinance, imposed an annual charge of $5 per pole upon the poles of a telephone company already established, as a "consideration for the privilege." The Supreme Court of Louisiana lately held, in the case of the City of New Orleans *vs.* the Great Southern Telephone and Telegraph Company, that this provision constituted neither a tax on property nor a license, and that it could not be sustained either under the taxing power or the police power.

The official announcement is made that the Mather Electric Company, of Manchester, Conn., will hereafter recognize the validity of the Sawyer-Man incandescent lamp patents which are owned by the Consolidated Electric Light Company, of this city. At an early date the patrons of the Mather Company will be supplied with lamps manufactured by the Sawyer-Man Company, the commercial agent of the Consolidated Electric Light Company. This is a change in the electric light field that will deeply interest the entire fraternity.

With the advent of the Edison Company's new literary work now popularly known as the "Red Book," and the announcement of the action of the Mather Company, following so closely on the triple alliance of the Thomson Houston, the Westinghouse and the Consolidated Companies, the last few months have not been without interest in electric light circles, from a legal standpoint. And there is that important case, now under advisement by Judge Gresham in Indiana, brought by the Brush Company against the Ft. Wayne Jenney Company, relating to arc lamp patents. Gentlemen, may we be permitted to remark that these are not altogether "piping times of peace," and as a thoroughly independent chronicler of events, the REVIEW is wide awake.

BOOK REVIEWS.

INTRODUCTION TO PHYSICAL SCIENCE, A. P. GAGE. Published by Ginn & Co., Boston.

The author is well known as the first writer who had the courage to advocate in a textbook the laboratory method of teaching physics. His Elements of Physics has been found to be attractive to the beginner, whether old or young. The present work is slightly easier, and well adapted to students without a teacher. It contains as much of the principles of natural philosophy as every practical mechanic should know. The chapter on electricity is clear and accurate. The omission of any mention of the practical applications of electric motors, storage batteries, and induction coils, will be noticed by those acquainted with the advancement of practical electricity. There are a few errors. In the illustration of a compound engine, p. 152, the piston rod of the large cylinder has no connection with any moving part.

ELECTRICITY AND MAGNETISM.—Macmillan & Co. have just issued a comprehensive little volume called "Electricity and Magnetism," by Balfour Stewart and W. W. Haldane Gee, both of the Owens College, Manchester, England. The book, which is intended as a basis of good school courses, is an abstract of the same authors' treatment of the subjects in their "Elementary Lessons in Practical Physics," and forms volume one of a series of similar abstracts.

Something more than an abstract has been prepared in the present volume, as much material appears for the first time. The book opens with a series of introductory measurements, with which it is essential the student should be familiar, and in the succeeding pages the subjects are taken up in a logical and well-defined order, the experiments being fully described and numerous exercises scattered through the chapters. The illustrations, many of them new, are all well drawn, and the mathematical demonstrations are concise and well arranged.

In the appendix are found plans of certain typical English school laboratories, a list of apparatus, tools and materials, notes on the organization of laboratory work, and other valuable information for the teacher. In short, the volume seems admirably fitted for what it is intended, namely, a complete textbook for schools. "Practical Physics for Schools," Vol. I. Stewart and Gee. Macmillan & Co., 1888, New York and London.

THE UNEXPECTED AS A SOURCE OF INVENTION.

It is a matter of proverbial remark that the great inventions have proceeded from apparently trivial causes, by those who recalled merely the incident and did not grasp upon this fact, that it was owing to the ability inherent within the mind of the inventor which was merely turned by the incident.

The swinging of a hanging church lamp occurred as often as it was lighted, but it required the mind of a Galileo to preceive that the attraction of gravity upon a swinging weight would afford a constant standard for the division of time and also a means of measurement of the attraction of the earth.

More apples have fallen from trees than have been gathered, but it required the mind of a Newton to be awakened in the direction of forming the hypothesis of the system of gravitation and the government of the solar system.

But as the same tendency by which some apparently insignificant seed is brought into fruition owing to the richness of the soil upon which it becomes lodged, so do we see that many of our most valuable improvements in mechanics and applied science are due to slight matters at their origin. The reversal of the dynamo, and therefore its use as a motor, was the result of a blundering connection at the electrical exhibition at Vienna, and the principles of the matter were not even suspected before that time. One of the most successful dynamos is the result of a remarkably unsuccessful attempt to make an electric motor. The leading steam pump was designed and invented as a water meter, and when it proved a failure in that capacity, a course of investigating the elements of its lack of satisfactory work showed that it would pump water in a very satisfactory manner.

A few years ago, one of the electric light companies made a dynamo of larger size, when it was found that its operation was not satisfactory. While those in charge of the dynamo were away, a young man took it upon himself to start it up, and by some mistake placed the brushes at nearly sixty degrees from the position assumed to be the correct one. The operation of the dynamo under these conditions was extremely successful.

In fact, of all the achievements in the way of machine construction, it is probable that nothing has been done so arbitrarily upon experimental efforts, and less by previous calculation, than the construction of the dynamo. For apparatus designed by those minent in the published theories upon the subject have not been successful in comparison with instruments made by persons without any pretension to a knowledge of electrical principles, but who have made their machines and reached their ends as the result of continual trials.

This is not to be interpreted as any disparagement of scientific knowledge, but it is intended rather to call attention to the fact that there is much in the books on the subject of electricity, which is based on assumptions which are founded upon hypotheses deduced from insufficient data, and which does not apply to the conditions met with in the design of apparatus,

It is not that liberal education is at fault, but that some of its exponents may be in error.

It may be stated without fear of contradiction, that no hydraulic engineer ever invented a successful turbine; that no one acquainted with thermo-dynamics ever produced any form of steam engine containing essential improvements. It is a thoroughly practical man who concentrates attention upon a subject, and because his mind has not been conventionalized by a rigid school training, reaches out into new and untried paths, principally because he does not know any better.

The moral to be drawn from these well-known precedents on matters of progress is, that a person possessing practical experience such as can be obtained only by beginning in the workshop, the drafting-room, or the first stages of whatever is to become his avocation, with this knowledge supplemented by an education which will give—first, an elastic type of mind, well-drilled, and able to conform to the consideration of any problems set before it; secondly, a knowledge of the forces of nature, of mechanics, and of the modern languages. Such a person will be equipped in the highest degree for any field among the technical professions.

But the number of failures in every phase of professional life as well as business career among those who have received advantages of the best schools, remind one that the advantages of education are merely an incident in a person's career, tending to rob the mind of its force and originality, and therefore placing greater responsibilities upon those who, by availing themselves of all these advantages, are prepared for broader action in life.

PERSONAL.

Mr. A. C. Smith, secretary and manager of the Geneva Non-magnetic Watch Company, has gone to Geneva for a brief business visit.

Mr. Geo. M. Meyers, general superintendent of the Pacific Mutual Telegraph Company, Kansas City, Mo., was a New York visitor last week, interviewing the telegraph men of the East.

Col. Geo. L. Beetle, of Chicago, is a New York visitor, and devoting his earnest efforts to the electric light business. Very naturally, as he is one of the vice presidents, he makes the Electric Club his abiding place.

Cleveland Hendricks Summers, of Chicago, the electrician of the Western Union, with headquarters in that western village, arrived a lone stranger in New York last week, but a visit to the Electric Club discovered a number of his old-time friends, and he was warmly welcomed.

Mr. Wm. F. Swift, secretary of the Brush Electric Company, who has made New York his headquarters for several months, has not been at all well for a few weeks past, and has found it necessary to spend a month or two in rest and recreation. During his absence Mr. C. C. Curtiss will be in charge of the Eastern headquarters of the company, at 36 Union Square, New York city.

E. C. Bradley, superintendent of telegraph on the Pennsylvania system east of Pittsburgh, was in New York last week, and took a fatherly interest in the welfare of C. H. Summers, of Chicago, and saw that he got started for the far West at the proper time. Mr. Bradley is not only a very successful telegraph man, but is thoroughly well informed in electrical science in general.

Col. Fred. A. Mason, of the Bridgeport Brass Company, is a New York visitor about once a week. Having been a handler of copper from his youth, in fact, inheriting it from his father, the sagacity that came as a result of years of experience, made it easy for him to realize that copper would go up, and his wise provision for the future was such that, since the remarkable rise in copper of several months ago, he has not yet had to purchase a single ingot.

The Metropolitan Railway Company of London have concluded an arrangement with the Electric Traction Company for the experimental running upon a section of the railway of an electric locomotive of the same power as the present steam locomotives. If it should prove successful the electric company is to have the option of entering into an agreement for working the railway for five years at a rate not to exceed the cost of the working by steam locomotives.

Bunnell & Co.'s Large Factory Burned.

The extensive electrical factory of J. H. Bunnell & Co., corner of Desbrosses and Greenwich streets, New York, was burned out Monday forenoon, March 5. The loss will aggregate about $40,000, fully covered with insurance.

The energetic firm take the loss philosophically, and state that all orders will be promptly taken care of, notwithstanding this temporary embarrassment.

THE PAST YEAR'S WORK OF THE PATENT OFFICE.

The following analysis of the comparative number of patents issued in each division of the Patent Office during the past year, accentuates some impressions which prevail among inventors and other interested parties, that the administration of the Patent Office has not yet attained absolute perfection, to say the least. In fairness, it should be stated that the averages are not mathematically accurate; and it is difficult to avoid errors where so many figures are involved, but it will be found, it is hoped, that substantial accuracy has been attained.

The table of course gives no idea of the number of cases acted upon, or the relative amount of labor involved in each class. It would probably appear, on investigation, that the personal equation of the examiners enters largely into the question, however, and that the number of formal objections and rejections is in inverse proportion to the number of patents granted.

The examining force proper consists of 29 examiners, one to each division, 139 assistant examiners (about), an average of five to each division, and 64 clerks, an average of two to each division; in all 232, or an average working force of eight to a division.

The table actually runs from Dec. 15, 1886, to Dec. 15, 1887, and is compiled from the monthly reports in the *Patentee*, and is believed to be substantially correct. It is needless to say that its preparation has involved much labor.

At the latter date the arrears of examination range from three weeks to five months. Three classes are five months in arrear; three, four months; *fourteen*, three months; and five, two months. There are only three classes in which a case can be even primarily examined within thirty days after filing. The average time for such a merely formal examination is *three* months.

The table shows the number of the division, the classes, the number of employes in the room, the number of patents issued from that division during the year, the average monthly issue, the number issued monthly per employe, and the arrearage of the class.

Among its most startling revelations, are that the annual issue is only 21,115, including *designs* (949); the monthly issues 1,745, 60 to a division, and about 7½ to an employe. In other words, *it takes four days to grant a patent.*

The classes are arranged in the order of patents issued, beginning with the highest. This arrangement brings out the fact, that, while one examiner grants 132 patents monthly, the average is about 60; while some go below 30, and one as low as 24. That is, one class grants 19 patents per month, per employe, while another averages a little over 3. While the classes may differ in complexity, it is hard to understand that one should issue five times as many patents as another, for such complexity alone cannot be the cause of so great a disparity in results. The table also shows that some of the highest classes are two or three months in arrears, which proves they are overcrowded.

On the other hand, classes 15, 17, and 26, *the only three five months in arrear*, show issues of *five or six patents per month, per employe, only*, an average of three times less than the three highest classes, and of one-half less than four others. Three classes average 15 per month, four 10, four 9, four 8, two 7, three 6, four 4 and one 3⅔.

These considerations might be further extended; but we leave our readers to ponder over the matter, and to try to suggest a remedy for a state of things so disastrous to the interests of those who support the Patent Office. The object of this article is to call attention to the results of the system, and not to reflect upon individuals.

Div.	Class.	Examiners.	Patents Granted During Year.	Patents Granted Per Month.	Patents Granted Per Month Per Employe.	Months in Arrear.
10..	Land conveyance	7	1583	132	19	2
24..	*Designs* (949), sewing machines	9	1491	118	13	3
11..	Leather working	7	1060	88	13	1
4..	Civil engineering	8	946	79	10	3
22..	Fire-arms, navigation, stone-working	8	907	76	10	1
23..	Instruments of precision (trade marks, 1,133, labels, 380, not counted)	8	894	75	9	3
12..	Mechanical engineering	9	889	74	8	3
8 .	Household furniture	9	885	70	8	3
13..	Metal working	7	842	70	10	3
1..	Tillage	7	840	70	10	2
5	Fine arts	10	813	68	7	4
18..	Steam engineering	7	794	66	9	3
20..	Builders' hardware, surgery	7	784	65	9	2
29..	Wood working	7	698	58	8	3
19..	Calorifics	9	670	56	6	3
2..	Farm stock and products	7	645	54	8	3
14..	Metal working, packing vessels	6	642	54	9	1
15..	Plastics, oils, fat and glue, refrigeration	9	616	51	6	5
9..	Hydraulics	10	560	47	5	2
21	Textiles	7	553	46	7	2
26..	Electricity, B	9	543	45	5	5
17..	Printing, binding, paper manufacture	9	487	41	5	5
25..	Milling, thrashing, brakes and gins	10	482	40	4	4
27.	Washing, brushing and abrading	7	482	40	6	3
16..	Electricity, A	10	470	39	4	2
6..	Chemistry	7	424	35	5	3
28 .	Pneumatics	8	423	35	4	3
7..	Harvesters	7	348	29	4	3
3..	Gas, metallurgy, brewing and distillation	7	285	24	3⅔	4
	Totals	232	21055	1745	....	....

NOTE.

A statement issued by the Patent Office gives the following data for 1887:

Patents	20,429	
Reissues	99	
Designs	949	
		Total .. 21,477
Trade-marks	1,333	
Labels	380	
		Total 1,513

These three classes last named affect the work in only two of the divisions. There is a discrepancy between our footings and those of the above numbers amounting to about one patent per year to an employe, but this does not affect the general averages, and therefore works no injustice to any one.

The Commissioner's annual report for 1887 shows the comparative number of applications filed and patents issued for the last five years to be as follows:

	Appl'ns.	Patents.	Rejections. Totals.	Rejections. Per Ct.
1883	35,577	22,383	13,194	36
1884	35,600	20,413	15,187	42
1885	35,717	24,233	11,484	32
1886	35,968	22,508	13,460	34
1887	35,613	21,477	14,136	40
Total	178,475	111,014	67,461	....
Average	35,695	22,202	13 492	37

It will be observed that the number of applications and patents last year was less than those for the two preceding years, and that the percentage of rejections has risen rapidly for the same period. The rejections average 13,492 for five years. In 1887 they number 14,136.

The rejections for five years average about 37 per cent. of the applications; for the year 1887 they amount to very nearly 40 per cent.

Electric Light Convention Echoes.

A FEW NOTES HERE AND THERE THAT NATURALLY GO WITH SO SUCCESSFUL A GATHERING.

There were many compliments passed on the Electric Club, of New York.

Already St. Louis is being talked of as the place of meeting one year hence.

The allied interests were well represented, and by a fine company of wide-awake boys.

The Pittsburgh dailies vied with one another in giving full accounts of the meetings.

T. Carpenter Smith, of Pittsburgh, was the only delegate who could measure inches in height with J. Frank Morrison.

Visits were numerously made to the various Westinghouse factories, under the guidance of some obliging official of the company.

Mr. Theo. Larbig, for many years connected with Holmes, Booth & Haydens, represented the New York branch of this sterling company at the convention.

Mr. Geo. F. Porter is becoming famous as the transportation man of the association. What he don't know about securing rates and accommodations from the railroad companies is yet to be discovered by electric light men.

It was not generally known that Chairman S. A. Duncan got up from a sick bed to take part in the convention work. For a week past he had been a sufferer from a severe attack of rheumatism.

Fred Royce, the eminent electric light installer, ran over from Washington by way of New York to Pittsburgh, and assisted in every way to make the convention the success it was, particularly socially.

There was immense regret that Goodyear, of the E. S. Greely & Co., and Phillips, of the American Electrical Works, were not present. They may be forgiven, if they are both present, in all their beauty, during the New York convention.

Mr. P. C. Ackerman was the representative of that widely and favorably known house, the American Electrical Works, of Providence. He was full of points on insulated wire, and in this direction there were many seeking information.

Says the Pittsburgh *Chronicle*: "The Electric Light Convention is over. It has been, taken all in all, one of the most interesting gatherings that Pittsburgh has ever seen, and electricians predict that great good to the science will result from the deliberations."

Mr. W. H. Harding, secretary of the National Electric Light Association, requests us to state that if the gentlemen whose railroad certificates were signed in pencil while at the convention, will send them to him at 11 South street, Baltimore, he will correct the mistake and secure for them the rebate.

Mr. J. P. McQuaide, of the National Conduit Manufacturing Company of New York city, made many friends at the convention. This was the first gathering of the electric light men he had ever attended, and he found them an active, wide-awake crowd. Mr. McQuaide took much interest in the discussion on underground wires.

The grand illumination which was presented Thursday evening, after the convention, when the stand pipes of the natural gas company were fired, was a sight that will long be remembered by the immense crowd of visitors and others that witnessed it. It was a sight that only Pittsburgh can furnish, and many were the thanks bestowed on Mr. T. C. Smith for this treat which he had arranged for.

A Washington visitor called on a friend and found him "out." The following line or two from him the next day explained everything. "Sorry I was not in when you called. Those electric light fellows are holy terrors. I will not attend another of their conventions until next September, if I live, when I hope to see you. Lord! how they did tackle the Monongahela—not the river. It was very fine." (Signed) F. R.

The REVIEW is under special favor shown by Supt. A. L. Reineman, of the Westinghouse lamp factory.

Mr. W. H. Boulton, of Cleveland, a well-known pioneer carbon man, was present. The business of the Standard Company he reports as quite heavy.

Mr. H. E. Duncan, the agreeable representative of the Waltham Watch Company, came very nearly been elected president—at least it was so announced in one of the Pittsburgh dailies.

Dr. Moses made the last hours of President Morrison happy with a charming resolution, which was carried with an enthusiasm which must have made thrills of satisfaction streak up and down the president's back.

It took two days to clear the Monongahela House of convention influences. There was so much electricity still hovering about that even the sweepers claimed that they got a shock with every swish of the broom.

Mr. E. R. Weeks, of Kansas City, besides being an officer of the National Electric Light Association, is also a prominent member of the Edison Association. He should be well informed, electrically, as he undoubtedly is.

Since W. R. Caulkins has become a Buckeye, and has devoted his energies to the Thomson-Houston Carbon Company at Fremont, he has grown a handsome Van Dyke blonde beard which would almost enable him to travel *incog.*

President J. F. Morrison was accompanied by his wife and his two nieces, the Misses Fulton. These ladies number quite a list of friends among the gallant electric light men, who are always pleased to greet them at the conventions.

Modern Light and Heat, with the same enterprise that characterized its work at the Boston convention, published a special electric light issue containing excellent illustrations of the officers and members of the executive committee, and freely distributed the copies to the Pittsburgh attendants.

Mr. H. B. Cram, of the Bernstein Company, exhibited two of his new and improved incandescent lamps for use on arc light circuits. After much study and experiment he has perfected a lamp that seems to meet the difficult requirements, and will soon be ready to introduce them to the lighting public, where there is a field for them.

President Davis' prompt action in extending the courtesies of the Electric Club to the electric light men, was unanimously approved by the Board of Managers, and duly recorded. The club management will no doubt aid in every way in making pleasant the visit of the telephone and electric light men to New York. These two conventions will probably come on successive weeks, near the first of September.

There were many visitors to the new offices of the Westinghouse company, corner of Garrison and Fayette alleys. Besides the laboratory, chemical room and other apartments which will be used for the purpose of storing electrical appliances, there is one room which is called the potometer room. It is a small apartment, totally dark; even the walls being covered with black paint. In the potometer room electric lights will be tested as regards their strength in number of candle power. The ground floor contains ten offices for the use of the officials. All are very elegantly furnished, with rosewood desks, chairs, and Brussels carpets, and all visitors were made to feel at home.

The East River Electric Light Station.

The East River Electric Light Company offer factory and storage room in New York city to manufacturers of electrical appliances. Their station, covering ten city lots in East 24th street, is seven stories in height and heavily constructed. It is designed to make it a great "beehive" for electrical manufactures of all kinds, and 1,500 horse power can be supplied day and night. A view of the building is given on page 4.

The Electro-Automatic Transit Company of Baltimore.

From the prospectus issued by the above-named company it is learned that a fast mail and express service is comtemplated, in which electricity will be the motive power. The mechanical apparatus of the Electro-Automatic Transit consists of a light structure, elevated some twenty feet from the ground; cars, pointed at both ends, as shown in the illustration, are run on two tracks, having also an upper or third rail, which acts as a guide rail and the conductor of the electric current. A permanent generator, of prescribed horse power, is located at each end of the line, from which the current passes to the conducting rail, and is immediately taken up by the traveling motor, to which one or more cars can be attached. On approaching its destination, it passes a certain defined point where the electric current is cut off, leaving the train to its own momentum, which gradually decreases. Each car then encounters a trip lever, located at a sufficient distance from the stopping place, which springs the brakes in succession, bringing the train to a standstill at a designated point.

In conclusion, we quote from the prospectus of the company:

"As illustrating the enormous speed which is possible to be attained by this system, a trip could be made between New York and Chicago in two hours' time. A train passing through Philadelphia Pittsburgh and Cleveland, would take up the electric current from the permanent generating plants located in the respective places named, thus making the route continuous. These are simply matters of experimental detail, and are noted to give an idea of future possibilities. The distance from New York to Chicago is 911 miles, which, at 10 miles per minute—a comparatively low rate of electric speed—would bring a trip within the time specified, making allowances for startings and stoppages. A road from thence, continued farther South, would bring the orange groves so near New York that their fruit could be eaten with all its lusciousness and flavor of early ripening. Continuing farther on, San Francisco might be reached by through trains, making due allowance for stoppages, within nine hours.

"This suggestion is appalling, and doubtless will have many cavilers; but let them, or any one, positively assert what may not or cannot be done, under the marvelous and astounding daily developments of the use of the electric force, and we will take a back seat, and let him or them do the figuring for the future."

A number of illustrations of the apparatus and the method of using it we present in this issue.

* * The Washington Cable Electric Railway Company, Washington, D. C., has been organized, with a capital of $3,000,000. A. T. Britton and others, incorporators.

A Human Incandescent Light.

The following dispatch from Lexington, Ky., might indicate several things, chief of which is possibly the high electromotive force of a famous Kentucky product:

"Some weeks ago Charles Baldwin, one of the best-known men of this city, was seized with a sudden and peculiar illness, lasting several days. Physicians afforded no relief, and he recovered as suddenly as he became ill.

"On his recovery he noticed one evening that his body in the dark gave off a steady light, visible 100 yards. The light is so strong, that, when Baldwin is nude, an ordinary newspaper can be read by the light from his body at a distance of six feet. He is perfectly well, and is not conscious of his power. Physicians say he is the wonder of the age."

.... Superintendents C. E. Topping, of the Long Island Railroad telegraph service, and W. Humstone, of the Western Union Telegraph Company, have decided to extend the service to Sag Harbor, Patchogue, Far Rockaway, Great Neck and Port Jefferson, to meet the increased business.

.... H. B. Markle, chief telegrapher of the Detroit division of railway telegraphers, East Saginaw, Mich., has formed a local division of the order called "The Saginaw Valley Division." A. H. Follett, of East Saginaw, was elected chief telegrapher, and C. Tryon secretary and treasurer.

Electric Light for Fifth Avenue Stages.

Manager Brown, of the Fifth Avenue Transportation Company, said to a *Sun* reporter that one of the most serious questions that the company has had to consider has been the lighting of the stages. Twenty to thirty different modes have been tried, but none has proved satisfactory. The constant jolting of the stages makes it next to impossible to use a lamp of any kind.

"We have tried oil lamps in every shape and pattern," he said, "but none of them will answer. We now use a twin candle, fixed in a spiral spring that shoves it up as it burns. We are experimenting, however, with electricity. A woman electrician has experimented with one of our coaches, and says she has solved the problem. She will put a light in the center of the roof of the stage that will give enough light to enable the passengers to read their papers in any corner."

.... The Callender Insulating and Waterproofing Company, 45 Broadway, has issued an attractive price list, printed in two colors. Special prominence is given to their Bitite and Trinidad insulated wires and cables. The Brown and Sharpe wire gauge is used in the list, but the company will quote for any size required.

Mother Swan's Telegraph.

"The very earliest telegraph in America," said great-grandpa, seating himself in his story-spinning chair, and taking Bright Eyes on his knee, "was in active operation in Vermont, while the first settlers were doing their best to become actually settled. Mother Swan lived there, in the center of what is now a flourishing town, but which was then a pathless forest; and being a widow, was obliged to look out herself for her little garden and live stock.

"Every morning the cows were let out to feed, and went straying away, through the woods, and sometimes, by three o'clock, not a tinkle of their bells could be heard. Then Mother Swan's telegraph came into play.

"She had eight children, and these she sent to find the wandering animals; but she did not dispatch them together, for then they might easily have become lost in the woods. The youngest child was stationed just far enough from the house for her mother to hear her if she should call; the next in size went only far enough to be able to communicate with the first, and so the line stretched out.

"When the one at the farther end of the line changed his position, in looking for the cows, he shouted directions back to the next station, and so the line moved to left or right, as the case might be, perhaps ending before the cows were found, in describing a circle about the house, exactly as that might be done by the minute hand of a clock, the log cabin, with the anxious mother, being at the center of the dial.

"At the first tinkle of the cow bells, 'Found!' cried No. 8, and 'Found!' repeated No. 7; and so the news ran along the line until Mother Swan herself received it. And the little sentinels kept their places until the cows had been collected and driven home, as nearly as might be in the line held by these original telegraph operators."

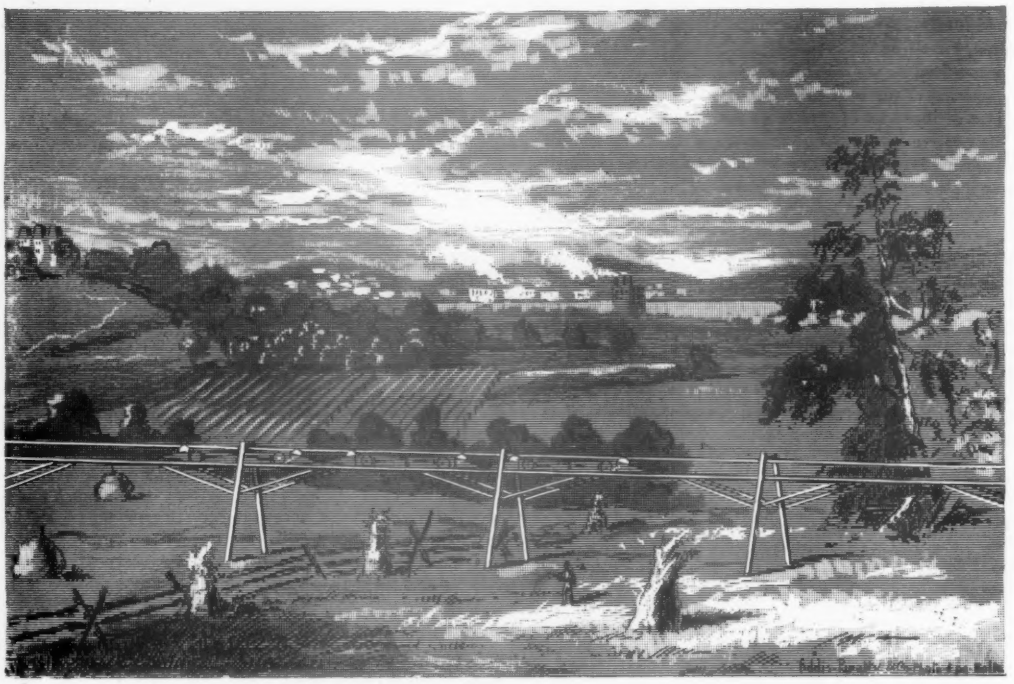


FIG. 1.—STRUCTURE OF ELECTRO-AUTOMATIC TRANSIT CO. FOR CARRYING PACKAGES ACROSS THE COUNTRY.

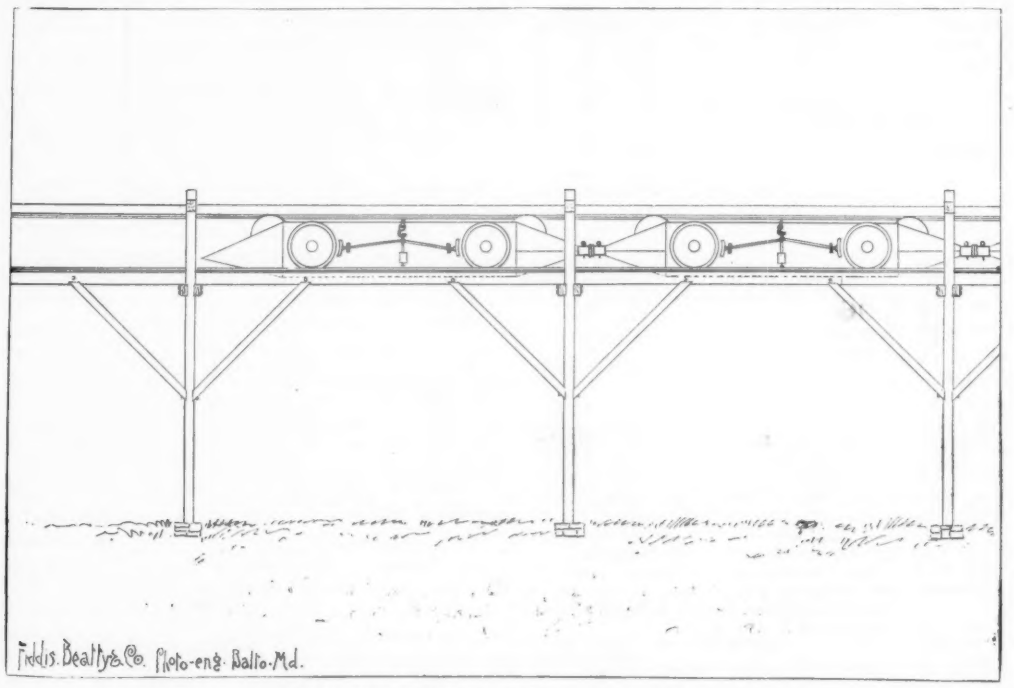


FIG. 2.—OUTLINE VIEW OF STRUCTURE AND CARS.

.... Mr. F. C. Mason, superintendent of police telegraph, Brooklyn, reports wonderful results obtained by the many hundreds of electrical men and others, who have given his "Mexican Rheumatic Remedy" a trial during the past six months. Mr. Mason obtained this valuable formula from a gentleman who has been a resident of Mexico for several years past. After having furnished it to many of his friends free of charge, and receiving from them many letters and testimonials regarding its wonderful properties for the cure of rheumatism and neuralgia he placed the remedy with the Ideal Medicine Co., 19 Park Place, N. Y., who find ready sale for all they can manufacture.

.... At a session of the Hillsdale City (Mich.) common council, the street gas lights were knocked out entirely, and the contract for lighting the city was awarded to the electric light company. Twenty-five arc lights were contracted for at $60 a light. The lights are to burn until one o'clock in the morning.

The Cleveland Leader Answered.

MANAGER MCKINSTRY, OF THE LOCAL COMPANY, WRITES A LETTER ON THE SUBJECT:

To the Editor of the Leader:

An article in Thursday's *Leader*, under the heading "Telephone Extortion," while not directed at the local company, contains many errors and does us great injustice. Our number of subscribers is nearly 400 less than the number given, our receipts are $30,000 less, and our expenses are five times as great—the pay-roll alone, a copy of which is inclosed for your inspection, being $36,000 per year, or 50 per cent. more than the gross amount you name Our operating expenses are a trifle over $100,000 per year, the rentals collectible under this bill would be about $68,310, leaving a deficit of $30,000 on operating expenses alone, making no allowance for depreciation of plant, which is very rapid. Some forty miles of wire alone taken down within the last three months was found so badly rusted as to be worthless for any purpose whatever. The Cincinnati company has recently expended $100,000 in renewing their plant, and Cleveland and other Exchanges must pursue the same course if good service is to be maintained. Your article indicates that the Indiana law has proven satisfactory, but this is not the case; on the contrary press and public joined in a demand for its repeal last winter, and this repeal was only prevented by the deadlock in the Legislature of that State. Under the prohibitive operation of that law which you mistakenly intimate has been satisfactory, nearly all the smaller exchanges have been closed and the larger ones have changed their system of charges from a given rental per month to a toll charge of five cents for each call, and this system except in a very few cases, largely exceeds the rental of $6 per month. Take, for instance, the case of a subscriber who uses his telephone an average of ten times per day, he would pay under this toll system $15 a month, nearly three times the rental in this city.

J. P. MCKINSTRY,
General Manager.

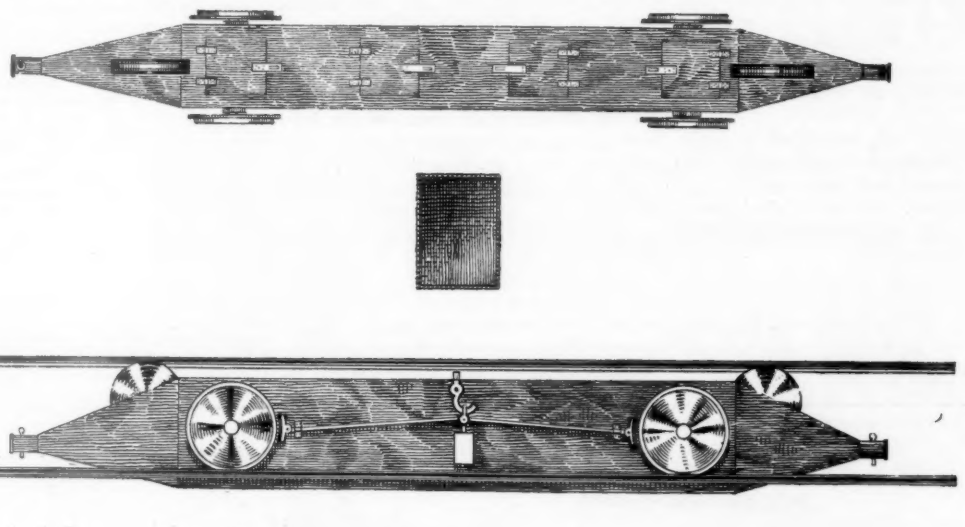


FIG. 4.—VIEWS OF THE CARRIAGE.

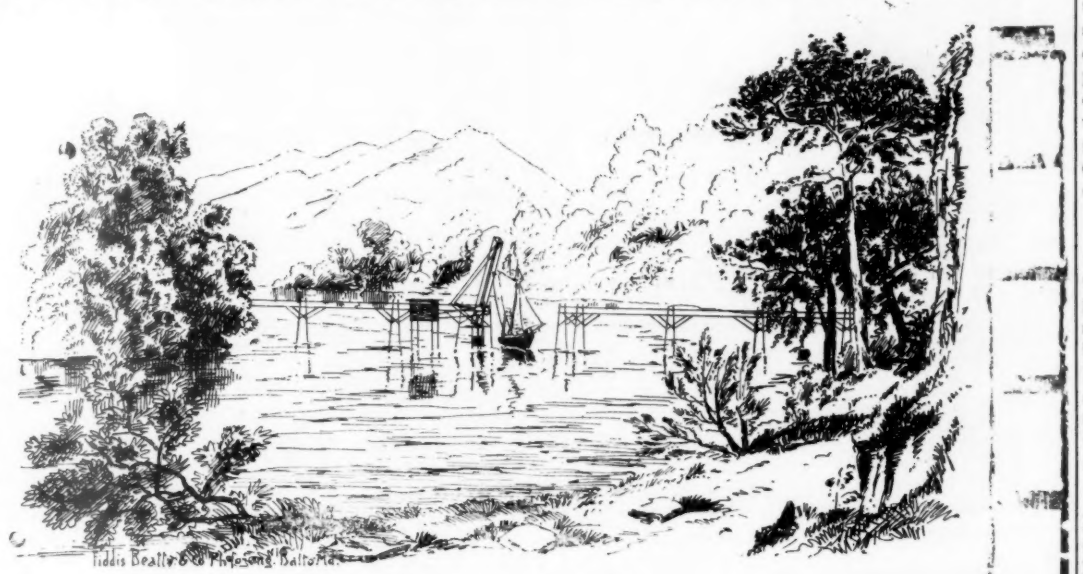


FIG. 5.—MODE OF CROSSING STREAMS.

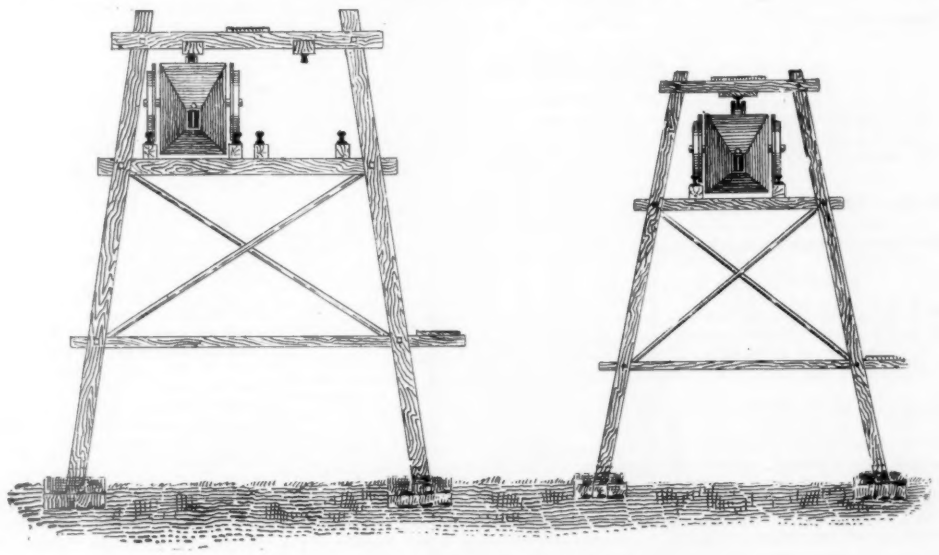


FIG. 6.—SINGLE AND DOUBLE TRACK ROADS.

Telephonic News

*** The telephone girls may fairly boast of being connected with the best people of the city—by wire.—*Boston Transcript.*

*** There have been several explosions in the telephone conduits in Buffalo, caused by an accumulation of gas; several men were badly injured, but none fatally.

*** The Rochester, N. Y., People's Telephone Association has submitted what they call their "final proposition" to the Bell Telephone Company, of Buffalo.

*** Lightning struck the tower of the telephone exchange at Greensburgh, Ind., and the fire department had to be called out to extinguish the flames. The damage was slight.

*** The telephone has been successfully used in ministering to fever patients without running the risk of infection. A telephone is fixed at the bed of the patient, and within reach, so that the patient can talk to friends or visitors in other rooms of the house or listen to a book read.

*** The question of underground wires in the city of Providence has been referred to a special committee. President Dennis, of the city council, appointed as the committee to prepare an ordinance looking to the removal of overhead electric wires, Messrs. Southwick, Pierce and Sheahan, and on the committee to consider the appropriation of $30,000 for the burial of electric wires, Messrs. Clarke, Burton and Reynolds.

*** Over 15,000 printed pages of testimony were submitted for the consideration of the Commissioner of Patents, to aid him in preparing his decision in the case of McDonough against Bell in the matter of priority of the invention of the telephone. Col. Robert J. Ingersoll and ex-Congressman Frank Hurd appeared for Mr. McDonough, and ex-Senator Roscoe Conklin and Hon. J. J. Storrow for the Bell Company, the arguments lasting for seven days.

*** The project of a telephone line to the Life Saving Station at the Two Lights, on the Cape shore, is well assured. Superintendent Richardson, of the Life Saving service, says that the sum required by the telephone company for building the line has been nearly raised by subscription, and that the line will doubtlessly be built early in the spring. For the first three years the line, which is about four miles long, will be maintained as a private line, after which the telephone company will maintain it at their own expense.

*** The Baltimore *Herald* last week presented a number of illustrations of the telephone exchange of that city, accompanied by an interesting description of the work done in that city. The report says:

"Much amusement is frequently furnished in the early morning hours when the girls are sending inquiries and sweet-voiced good-mornings over the lines. Many a man gets out of bed at the telephone's ring and stands in an abbreviated burlesque of a Mother Hubbard, and after yelling in the inoffensive 'phone, 'Yes, the blamed thing's all right,' kicks over a chair and retires to bed shedding profanity at every pore, which the maiden, happily, is all unconscious of. Between 8 A. M. and 6 P. M. each day an average of 19,000 calls are answered, and, although much has been written and said about the telephone girl and the pranks she plays upon the innocent subscriber, one can readily see that little time is daily found in which to indulge in pleasantries. Of course, when Charley uses the 'phone, how can one resist saying just a wee word or two about the delightful time spent last night?

ELECTRIC LIGHT NEWS

—— Anna, Ill., is now illuminated by the electric light.

—— Mr. Geo. H. Grant, of Bar Harbor, Me., will light the borough of Bucksport.

—— A large audience was present at the first annual reception of the Philadelphia Electrical Society, held February 22d.

—— The Somerville Electric Light Company is placing electric lights in the town of Arlington, Mass. This light will very likely be adopted by the city.

—— Mr. F. S. Terry, Manager of the Electrical Supply, at Chicago, and Francis W. Parker, Lawyer and Patent Solicitor, were visitors in New York last week.

—— The Middletown Electric Light Company, Middletown, Me., has duplicated its incandescent plant. The new addition is expected to be in running order this week.

—— The Mather Electric Company, Manchester, Conn., are running a force of about 150 men, and are running over ten hours daily, with constantly increasing business.

—— The city of Sherman, Texas, has purchased the plant of the electric light company for $6,000. The plant has a capacity of 60 arc lights which will furnish all the city lights at present needed.

—— The Brush Electric Company have just placed a 150 incandescent plant of the Brush-Swan system in the offices, press and composing rooms of the Topeka *Commonwealth*. This work was effected through the Kansas City agency.

—— The "Harlem Electrick Light Co.," New York, recently received a communication directed as above and reading as follows: "Your man promised to send me six lamps as reserve for *Incontestible* light." This is probably a new term for the Slattery system.

—— Mr. Schuyler S. Wheeler, electrician and superintendent of the C. & C. Motor Company, is the author of an interesting resumé of modern electrical work, in a recent issue of *Harper's Weekly*. The article is elaborately illustrated, and was issued as a complete supplement.

—— Arrangements are being made to have the electric light in operation in Wellston, Ohio, within thirty days. There will be at first twenty street lights, and the incandescent system for lighting residences and business houses. The plant will be put in connection with the power at Milton Furnace.

—— At Greenville, Miss., a meeting of the incorporators of the Greenville Electric Light and Power Company was held last week, and the company have secured from the city the right to erect poles and wires, etc. An eighty-light plant has been contracted for and will be in operation within two months as soon as the weather permits.

—— The Austin Water, Light and Power Company, of Austin, Texas, has now in operation 120 Brush arc lights running, at an annual rental of $150 per annum. They have also about 2,600 Westinghouse incandescent lamps burning. Much of the success of this new company is due to the energy of Mr. M. D. Mather.

—— The Salina, Kansas, *Republican* of February 12, devotes its issue very largely to an illustrated description of the Salina Electric Light and Power Company. There are numerous excellent illustrations, not only of all the machinery, apparatus and factory, but also of the officials of the company. The system installed is the Fort Wayne Jenney, and the citizens are justly proud of the good work done. The *Republican* claims that Salina will be, in the course of thirty days, by which time all the lights will be running, the best lighted city in the State of Kansas, which is saying a good deal, for there are a number of well lighted cities in this progressive Western State.

Organization of the Mitchell Vance Co.

The business of the late corporation of Mitchell, Vance & Co., has been purchased by the Mitchell Vance Company, 836 and 838 Broadway, and this company is now the owner of the extensive plant consisting of the manufactory, machinery, patterns, and all the other property of said late corporation. It is now fully prepared to receive orders for all goods formerly manufactured by the old concern, and the most careful attention will be given to all details of the business.

The high and long-established reputation of the old company, for excellence of workmanship, material, and finish will be vigorously maintained. New and original designs will be added at once to the complete assortment heretofore offered.

Mr. Geo. B. Coggeshall, so well and favorably known in this field, will be actively connected with the new company, which is a guarantee that the work of the new company will be of the highest order.

Electricity as a Disinfectant of Sewage.

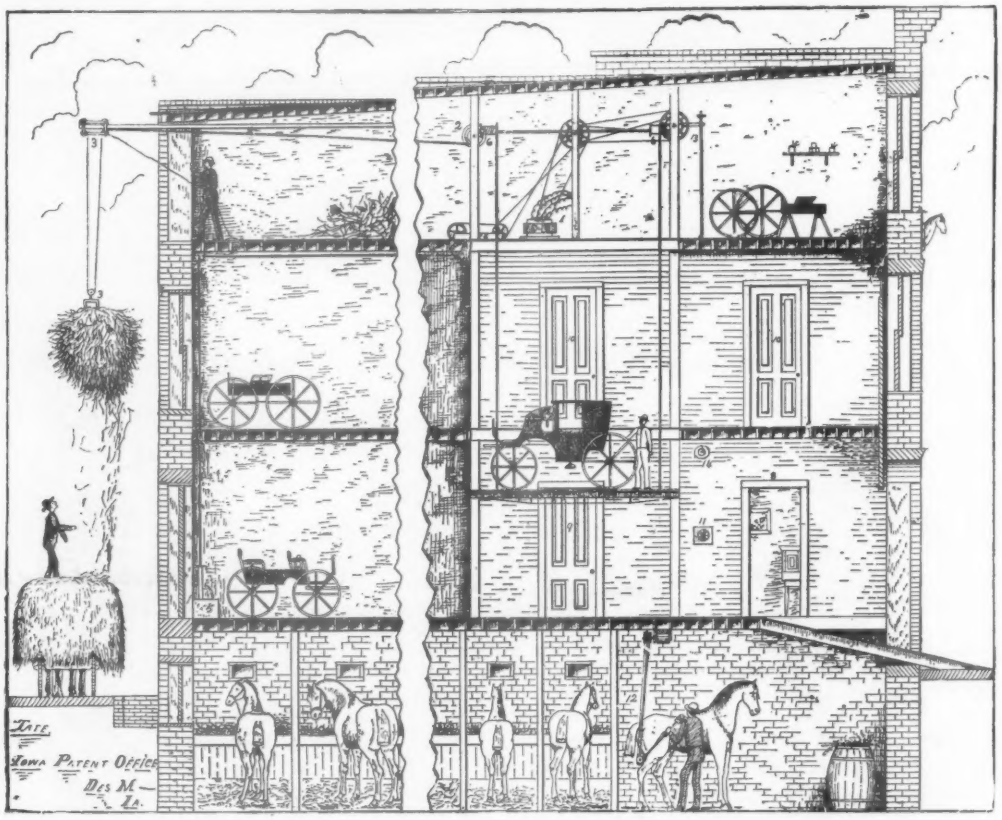
Among the many good uses to which that dangerous element, electricity, is now being put, not least is its application for the disinfection of sewers, experiment on which is now being made on a large and costly scale in London. According to a statement made in the London *Standard*, the Metropolitan Board are about to expend £1,000,000 in purifying the London sewage so as to deliver the waters of the Thames from pollution. For this purpose, and with a view of employing chemicals, enormous works have been constructed, but before they are under way along comes Mr. Wm. Webster, F.C.S., who has had large experience in works of drainage, etc., with a plan which he has patented, and the mere outline of which the *Standard* gives as follows:

A current of electricity, produced either from cells or from a dynamo, is sent into the sewage, the transmission being effected through metallic electrodes. Instead of casting chemical ingredients into the sewage, the inventor adopts the plan of creating his chemicals in the sewage itself by the action of the electric current on the electrodes and on the sewage. The effect is curious, and is well seen when the liquid is exposed to view in a glass vessel. An inky fluid, obtained from the Deptford pumping station of the Metropolitan Board, has all its particles set in motion by the electrical current, a kind of procession taking place from the top downwards and from the bottom upwards. The sum total of the movements consists in landing the suspended particles at the top of the liquid, thus exactly reversing the usual chemical process, which sends everything down in the form of a precipitate. The upward action is due to the presence of certain gases, at first extricated by the electric current, and afterwards mingling with the organic matter, so as to give buoyancy to the latter. By agitating the liquid the gases can be sent off into the air, and the solid particles will then descend to form a precipitate, showing no tendency to permeate the fluid as before. But, as will be shown presently, there is no need to effect this precipitation. So prompt is the effect of the electric current, that in the space of twenty minutes a volume of opaque sewage becomes perfectly transparent, except at the top, where the organic matter collects in a semi-solid form. A sample which we saw thus treated presented at the close a somewhat milky aspect, apparently due in large measure to the presence of chalk, the Deptford sewage being impregnated with the water supply of the Kent Company, derived from deep wells in the chalk formation. Some portion of the cloud might also be occasioned by suspending clay. But the tint was slight, and the contrast exhibited before and after treatment was of a most striking character. It should be added that no offensive odor was perceptible.

It is claimed for this process that it effects the removal of all the solids in suspension in the sewage, and also the greater part of the matter in solution. In actual practice on a working scale, the separated portion floating at the top of the sewage can be run off by one channel, and the clear water beneath by another. Mr. W. Webster has carried his experiments beyond the mere bounds of the laboratory, but is anxious for a more extended test, so as to establish the character of his process beyond doubt. Of course the element of finance comes in. For this purpose, certain data are already available, and these are so far of an encouraging nature. From the results already obtained, it is calculated that the cost of the electric current for treating the entire volume of the London sewage, north and south, would be about £25,000 per annum. This sum represents the working expenses, and compares with the cost of the chemicals employed by the Metropolitan Board in their treatment of the sewage. The annual outlay for chemicals when the plant comes into full operation is expected to be £18,000 for lime and iron, and £12,000 for permanganic acid, thus making a total of £30,000 per annum. Accordingly, so far as estimates go, there is a balance in favor of the electric method. But in the latter in stance there is the advantage of a purer effluent, as also of a quicker process A peculiar feature to be contemplated is the very small addition which the electric method makes to the solid residuum. No chemicals are introduced into the sewage, except the small quantity thrown off from the electrodes. This may be reckoned at a grain per gallon, amounting, in the immense volume of the London sewage, to ten tons per day.

Mr. Webster's electric plan for the treatment of sewage has already been exhibited in an experimental form to Sir Joseph Bazalgette and Mr. W. J. Dibdin, the art engineer the chemist to the Metropolitan Board. Other scientific authorities have also seen the experiments, and enough has been demonstrated to gain for the new process a respectful consideration, if not something more. In all probability the Metropolitan Board will proceed at once to inquire into the merits of this remarkable process. With respect to the question of the water supply, Mr. W. Webster has applied his plan with great success to the purification of water intended for drinking purposes. The filtration of the metropolitan supply costs the London water companies at the present time nearly £16,000 per annum. It will be a singular transformation if their filter beds should be superseded by an array of electrodes.

Notwithstanding the great value of electricity in its present uses of transmission of thought by sound, of propulsion, of lighting the heavens and the homes of the people, etc., the disinfection of sewage and the destruction of deadly gases, if it can produce these results, will prove its greatest benefits to the civilized life of humanity in great cities and large towns. The experiments in London will have a world-wide importance, and will be watched with great interest everywhere.



THE WELLS MACHINE IN USE IN THE STABLE.—ELECTRIC MOTOR POWER.

The Minneapolis Electric Club.

The Electric Club idea is still extending. The Electrical workers of Minneapolis, Minn., to the number of thirty five, assembled at the West Hotel and organized a club, with the following officers:

President, G. N. McDonald; vice-presidents, Vernon Bell, R. T. Reid, N. J. Mershon, J. W. Phinney; secretary, W. B. Joyce; treasurer, W. C. Thompson.

The secretary was instructed to correspond with similar organizations in the East and secure copies of their constitutions and such other information as might be of value.

The Wells Machine for Cleaning Horses.

This machine is calculated to meet the requirements necessary to a perfect power horse cleaner, and is commonly driven by a small motor.

Running by a belt, the tension can be changed, in a moment, to suit the operator (see fig. 1). The machine is adjustable to any height ceiling and to any width of space.

It is manufactured by J. O. Wells, Des Moines.

The practical application of a small motor, from one to five horse power, unless in stables of large proportions, where more will be required, is the means of saving much money, time and annoyance to the stable keeper. In buildings of two stories or more a power elevator will save many times its cost in convenience, in the storage of vehicles, sleighs, etc., instead of the old-time rope and four or five men, and the scarcely perceptible motion; the platform is raised with a quick, steady movement, that renders the second or third floor as accessible as the rear portion of the first.

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING FEB. 28, 1888.

378,426 Automatic electric photographing apparatus; Edward N. Bliss and James F. Middleton, Newark, N. J.

378,432 System of electrical distribution; Thomas P. Conant, Brooklyn, N. Y., and Zach. Latshaw, McKeesport, Pa., assignors to the Electrical Accumulator Company, of New York.

378,436 Printing telegraphy; Patrick B. Delany, New York, N. Y.

378,437 Printing telegraph; Patrick B. Delany, New York, N. Y.

378,440 Electric railway station indicator; George Guntz, Wilkesbarre, Pa.

378,451 Self-exciting alternate current electric generator; Otto A. Moses, New York, N. Y., assignor to the Westinghouse Electric Company, Pittsburgh, Pa.

378,464 Telegraph repeater; Louis Russell; Cherokee, Kan.

378,484 Battery vessel; John Wiest, York, Pa.

378,517 Rail connection for electric railways; Edward L. Orcutt, Somerville, Mass.

378,519 Three-way safety switch; William F. D. Pascoe and James W. Raub, South Easton Pa.

378,527 Automatic switch for secondary batteries; John S. Sellon, Hatton Gardens, County of Middlesex, England, assignor to the Electrical Accumulator Company, of New York.

378 547 Regulator for electric generators; Warren S. Hill, Boston, Mass.

378,552 Relay magnet; Edward L. Orcutt, Somerville, Mass.

378,560 Test box for underground electric wires or cables. 378,561 Conduit for electric wires and cables; Richard S. Waring, Pittsburgh, Pa.

378,616 Arc light; Lawrence N. P. Poland, Cincinnati, Ohio.

378,629 Secondary battery; Max Stecher, Philadelphia, Pa., assignor of one-half to Charles Wiezmann, same place.

378,657 Automatic electric air brake; J. Fairfield Carpenter, Berlin, Germany.

378,658 Valve for electro-pneumatic railroad brakes; J. Fairfield Carpenter, Berlin, Germany.

378,668 Electrical stop motion for steam engines; Robert Exley, Philadelphia, Pa.

378,677 Electric gas lighting apparatus; Charles W. Holtzer, Brookline, Mass.

378,679 Lock-out box and shunt circuit for telephone exchanges; Charles H. Haskins, Milwaukee, Wis., assignor to the Western Electric Company, Chicago, Ill.

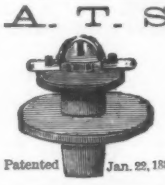
378,681 Apparatus for bleaching by electrolysis; Eugene Hermite and Charles F. Cooper, Pownall Road, Dalston, County of Middlesex, England, assignors of one-third to Edward James Patterson, same place.

378,737 378,738 System of electric distribution; Thomas Spencer, Westbrook, Conn.

378,780 Telephone; Leo Ehrlich, Benjamin Dubinski, and Gustavus Rein, St. Louis, Mo., said Dubinski and Rein assignors to said Ehrlich.

378,797 378,798 Machine for forming type bars; Ottmar Mergenthaler, Baltimore, Md., assignor to the National Typographic Company, of West Virginia.

A. T. SMITH'S



NEW PAT'D. ELECTRIC LAVA GAS TIP,

The Cheapest and Best Burner in the market

For Multiple Lighting.

Send for prices to

Patented Jan. 22, 1884 A. T. SMITH, 6 West 14th St., New York.

BUSINESS NOTICE.

ROOSEVELT *vs.* LAW TELEGRAPH CO. } *Notice of Decree of U.S. Court.*

We beg to inform you that in the suit of ROOSEVELT *vs.* THE LAW TELEGRAPH CO., a decree has been issued by the United States Court in favor of the plaintiff.

The above suit was brought for infringement, by what has been known as the "Law Battery," on the Leclanché Patent of November 16th, 1880, which covers the celebrated "Gonda" Prism battery manufactured by this Company. The opinion of the Court is an exhaustive one, covering every point in the case and sustaining the Leclanché Patent in the broadest possible sense. Injunction has been issued against the manufacture and sale of the said "Law Battery," and all persons making, selling or using the same are subject to penalty thereunder and will be legally proceeded against.

Very respectfully,

THE LECLANCHÉ BATTERY CO.

149 W. 18th Street, N. Y., Feb. 16, 1888.

WANTED.

A reliable, competent man of experience to superintend a combined Arc and Incandescent Electric Light Plant. References required.

Address "Electric," care this Office.

BUSINESS NOTICE.

OFFICE OF JOHNSON, HOLLAND & CO.,
222, 223 & 225 Phenix Building,
Chicago, Ill., Feb. 18, 1888.

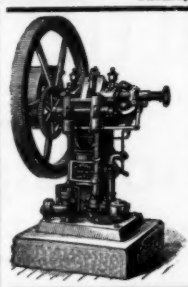
The undersigned respectfully call your attention to the recent transfer of their business to the NORTH-WESTERN ELECTRICAL ACCUMULATOR COMPANY, and earnestly solicit for the new company your further patronage and correspondence.

Yours respectfully,
JOHNSON, HOLLAND & CO.

FARADAY CARBON CO.,
(FORMERLY PITTSBURGH CARBON CO.)
CAPACITY,
ONE MILLION CARBONS MONTHLY.
Quality guaranteed equal to any in the market.
PRICES LOW.
Liberal discount on large orders. Correspondence solicited
Pittsburgh, Penna.

MICA ALL SIZES AND QUALITIES
For Electrical Purposes.
EUGENE MUNSELL & CO.,
218 Water Street, New York.

W. R. OSTRANDER & CO.,
21, 23 & 25 ANN STREET, NEW YORK.
Manufacturers of
SPEAKING TUBES, WHISTLES, ANNUNCIATORS,
Electric & Mechanical Bells.
FACTORY,
De Kalb Avenue,
BROOKLYN.
Send for Illustrated Catalogue.



KORTING
GAS ENGINE
—1 to 60 H. P.—
Most economica. Engine yet offered to the public, and specially adapted for running dynamos.
Address
Korting Gas Engine Co.,
LIMITED.
60 Barclay Street, N. Y.

GIVES MORE POWER USING LESS WATER THAN ANY OTHER WHEEL.
THE OLD RELIABLE
—LEFFEL—
WATER WHEEL
SEND FOR CATALOGUE.
JAMES LEFFEL & CO.
SPRINGFIELD, O., OR 110 LIBERTY ST., N.Y.

FULL SIZE!!!!!
O. K. NO ONE
Denies this to be the only safe automatic in the
LAND.
Perfected
IMPROVEMENTS
Commend it to the Trade.
$6.00 EACH.
Discount (—).
O. K. A. L BOGART,
22 Union Sq., N. Y.

Detroit Electrical Works
MANUFACTURERS OF
ELECTRIC SUPPLIES,
INCLUDING
Medical Batteries, Skeleton and Box Bells, Burglar Alarms, House Annunciators, Fire Alarm Boxes, Pins, and Brackets,
INSULATED MAGNET, TELEPHONE AND ELECTRIC LIGHT WIRE.
GENERAL OFFICES and FACTORY:
DETROIT, MICHIGAN.

SILKS. Full assortment of different sizes and qualities on BRAIDER SPOOLS, ready for the machines, in Red, Yellow and Green. Other colors to order.
SEND FOR SAMPLE AND PRICES.
WM. MACFARLANE & CO., - - 55 Mercer Street, New York.
MILL, YONKERS, N. Y.

C. & C. Electric Motor,
UTILIZING IN SMALLEST MOTORS LATEST DYNAMO IMPROVEMENTS.
Automatic Motors, or with the Wheeler Safety Regulator.
Wound for any circuit.
C. & C. ELECTRIC MOTOR CO., 88, 90 and 92 South Fifth Ave., N. Y.

The Empire City Electric Co.,
15 Dey Street, New York,
Manufacturers of
Telephone, Telegraph,
AND
ELECTRIC LIGHT SUPPLIES.
WRITE FOR PRICES.

Leclanché,
The Standard Open-Circuit Batteries of the World.
GONDA and DISQUE,
The Only Genuine Leclanché Batteries
Are those which bear this LABEL and the Trade-Mark, GONDA.
DO NOT BE IMPOSED UPON BY IMITATIONS.
If dealers have not the Genuine Battery, send direct to us for Price-List.
THE LECLANCHÉ BATTERY CO.,
149 West Eighteenth Street, New York.

GONDA (FORMERLY PRISM) CELL, COMPLETE.

GENUINE DISQUE CELL, COMPLETE.
The Porous Cell also bears Label.

NEW YORK BELTING AND PACKING CO.

WAREHOUSE: 15 PARK ROW, NEW YORK.

The Oldest and Largest Manufacturers in the United States of

VULCANIZED RUBBER

In every form adapted to mechanical purposes.

MACHINE BELTING,

With Smooth Metallic Rubber Surface.

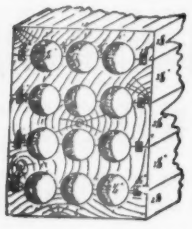
This Company has Manufactured the Largest Belts made in the World for the principal elevators at Chicago, Buffalo and New York.

We make a Superior Quality of Belting for Electric Light purposes, for use on Dynamos and swift running machinery.

JOHN H. CHEEVER, Treasurer.

European Branch: Pickhuben 5, HAMBURG, (Freihafengebiet), GERMANY

THE MACDONALD SUBWAY ELECTRICAL CONDUIT.



PATENTED JULY 6, 1886. No. 334,843.

This Conduit is made of Creosoted Timber in 16 feet Lengths.

It is simple, **durable, easily laid, water tight,** and not **expensive.** Conduits from one-half inch to three inches.

Circulars and information furnished.

GEORGE S. VALENTINE,

(Manager Eppinger & Russell Creosoting Works,)

SOLE AGENT,

OFFICE, - - - 160 WATER STREET, N. Y.

D. W. Baker. C. O. Baker, Jr.

BAKER & CO.,

Importers, Melters and Refiners of

PLATINUM,

408, 410, 412 and 414 N. J. R.R. Ave., NEWARK, N. J.

Platinum in sheet and wire, all sizes, and any degree of hardness. Scrap and native platinum purchased.

BOOKS ON ELECTRICAL SUBJECTS

will be mailed to any address, postage prepaid, on receipt of price. Address,
ELECTRICAL REVIEW PUB. COMPANY,
13 Park Row, New York. P. O. Box 3,329.

EDISON MACHINE WORKS,

Schenectady, N. Y.

MANUFACTURERS OF

INSULATED WIRES, FLEXIBLE CORDS AND CABLES,

—FOR—

Telephone, Telegraph AND Electric Light.

JAMES F. KELLY.

GENERAL SALES AGENT,

19 Dey Street, New York.

CENTRAL ELECTRIC COMPANY,

38 and 40 La Salle St., Chicago.

Electric Light Carbons

Of Guaranteed Life and Brilliancy to Fit any System.

In ordering, please state for what System they are required.

WESTERN AGENTS FOR OKONITE WIRES AND CABLES.

WRITE FOR PARTICULARS.

WE CAN HELP YOU.

THE VULCAN WIRE,

HERETOFORE KNOWN AS

THE CAMPBELL LINE WIRE,

For the Electric Light, Telephone and Telegraph,

MANUFACTURED AND SOLD BY

THE CAMPBELL ELECTRICAL SUPPLY CO.

95 MILK STREET, - - BOSTON, MASS.

WRITE

For the Electrical Review's *New Catalogue* of all Electrical and Scientific Books.

13 PARK ROW, NEW YORK.

THE THOMSON-HOUSTON ELECTRIC CO.

SOLE OWNERS OF THE ONLY PERFECT AND AUTOMATIC SYSTEMS OF

ARC — INCANDESCENCE — POWER

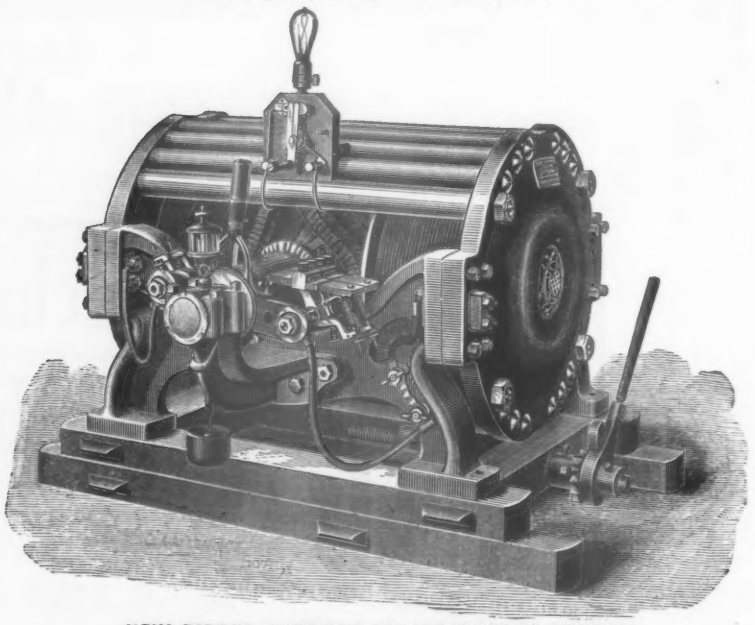
50,000 LAMPS

OPERATED FROM OUR CIRCUITS

LAMPS FROM 1,000 C. P. TO 50,000.

SPECIAL CIRCULARS

ALTERNATING AND DIRECT

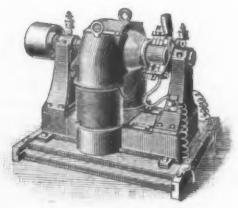


NEW DIRECT CURRENT INCANDESCENCE DYNAMO.

INCANDESCENCE DYNAMOS

STATIONARY MOTORS

Of any Horse Power from ½ to 30.



MOTOR

COMPLETE SYSTEM FOR TRAM CAR PROPULSION.

UPON APPLICATION.

General Offices, 178 DEVONSHIRE STREET, Boston, Mass.